GEO-ENVIRONMENTAL CONSULTING

# LAND AT BENMORE ROAD, BLACKLEY

## Remediation Validation Report



Report Ref: BEK-23104-3 Rev A

Date: March 2025

GEO-ENVIRONMENTAL CONSULTING

# Project Quality Assurance Information Sheet

| | |
|---|---|
| Site | Land at Benmore Road, Blackley |
| Report Title | Remediation Validation Report |
| Report Status | Final |
| Report No | BEK-23104-3 Rev A |
| Date | March 2025 |
| Prepared For | **THE CASEY GROUP**<br>Rydings Road<br>Rochdale<br>OL12 9PS |
| Prepared By | **BEK ENVIRO**<br>No 2 Landwick Court<br>Metcalf Drive<br>Altham Business Park<br>Lancashire<br>BB5 5GY |
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GEO-ENVIRONMENTAL CONSULTING

# LAND AT BENMORE ROAD, BLACKLEY

## Remediation Validation Report

**PROJECT NO:** 23104

**REPORT REF:** BEK-23104-3 Rev A

**DATE:** March 2025

## REVISION STATUS / HISTORY

| Rev | Date | Issue / Comment | Prepared | Checked |
|---|---|---|---|---|
| A | 07/04/2025 | Local Authority Comments | MLM | MB |
| | | | | |
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| | | | | |

## GENERAL REPORT LIMITATIONS

BEK Enviro Limited (BEK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and BEK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by BEK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of BEK and the party for whom it was prepared. Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

Unless explicitly agreed otherwise, in writing, this report has been prepared under BEK's limited standard Terms and Conditions as included within our proposal to the Client. The report needs to be considered in the light of the BEK proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

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# 1. INTRODUCTION

## 1.1 Background

1.1.1 BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to prepare a Verification Report to support the validation of the garden remediation works required at the site located at Benmore Road, Blackley, Manchester (hereafter referred to as 'the site').

1.1.2 This Verification Report relates to the verification of the clean cover system required for Plots 1 to 20 and the public open space areas (POS) at the site.

1.1.3 The verification of the gas mitigation measures is understood to have been completed by others and is therefore outside the remit of this report.

1.1.4 The site is located at the former Whitemoss Community Resource Centre, Benmore Road, Blackley, Manchester M9 6EH. The site was generally covered encompasses an area of vacant land covered in grass.

1.1.5 Manchester City Council has granted planning permission (subject to conditions) for the 'erection of 20 two storey dwelling houses (Use Class C3a) with associated parking, landscaping and boundary treatment and access from Benmore Road' at the site at Land off Benmore Road, Blackley, Manchester (Application No: 135788/FO/2022).

1.1.6 The site has been subjected to previous site investigation, assessments and reporting, the details of which are provided within the following reports:

- Curtins Consulting Limited – 'Phase 2 Geo-Environmental and Geotechnical Report for Former Whitemoss Community Resource Centre Project 500 Sites' Report Ref: 077873-CUR-00-XX-RP-GE-041-P01, dated November 2022.

- BEK – 'Site Investigation & Ground Assessment' Report Ref: BEK-23104-1, dated September 2023.

- BEK – Remediation Method Statement – Benmore Road, Blackley (Ref: BEK-23104-2, dated October 2023).

1.1.7 The above reports have been submitted to and approved by Manchester City Council as required. The specific remediation measures recommended in the BEK Remediation Method Statement (RMS) have been implemented and the RMS should be read in conjunction with this report.

1.1.8 The proposed development is shown as Figure 1 below.




*Figure 1: Proposed Development Layout*

## 1.2 Limitations

1.2.1 This report has been prepared by BEK for the sole benefit of CG. The conclusions in this report are professional opinions of BEK based on the information available.

1.2.2 This document has been prepared for the residential development located to the east of Benmore Road, Blackley and should not be relied upon or used for any other project. BEK accepts no responsibility or liability for the consequences of this document being used for a purpose other than that purpose for which it was commissioned.

# 2. REMEDIATION STRATEGY

2.0.1 The approved remediation works are detailed in the RMS (Report Ref: BEK-23103-2 (Rev A), dated October 2023).

2.0.2 In order to remove potential risks associated with contamination, the following specific remediation works have been recommended.

## 2.1 Contamination

2.1.1 To mitigate the potential risks to human health associated with widespread variable made ground across the site, the following works will need to be undertaken:

*All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing.*

## 2.2 Imported Material

2.2.1 It is likely that the soils to be used in the clean capping will be imported. The suitability of the sub/topsoil should be independently validated to ensure a suitability for use.

## 2.3 Construction Workers

2.3.1 It is recommended that construction personnel involved with direct contact with the soils at the site use appropriate PPE equipment (i.e. boots, gloves and overalls).

2.3.2 In addition, hygiene facilities should be made available in accordance with general health and safety guidelines. The successful remediation/site works contractor should undertake a suitable Risk Assessment to confirm the appropriate level of PPE.

2.3.3 A copy of all reports relating to the site should be included in the site Health & Safety File and site workers should be made fully aware of the sites setting.

## 2.4 Unforeseen Circumstances

2.4.1 Any areas of previously unidentified potentially contaminated soils encountered during site construction works must be brought to the attention of BEK, to ensure that the recommendations herein apply. Any potentially contaminated soils should be left in-situ and subjected to further assessment, to potentially include further chemical testing and risk assessment.

## 2.5 Utilities

2.5.1 Prior to redevelopment, BEK would recommend that a copy of this report and the Curtins Consulting Phase II Ground Investigation Report and the Site Investigation & Contamination Assessment report prepared by BEK are supplied to utility companies, and that their recommendations relating to appropriate supply pipes are adhered to.

2.5.2 It may be necessary to compete the UKWIR Risk Assessment to confirm water pipe specification.

## 2.6 Concrete Mix Design

2.6.1 BEK recommends that as a minimum the design sulphate class for the site should be designed for DS-1 conditions and ACEC class AC-2z.

2.6.2 Confirmation that the correct concrete mix has been used on site is outside the BEK validation remit.

## 2.7 Off-Site Disposal

2.7.1 The chemical testing regime for off-site disposal may be different to the chemical testing required to assess the suitability of the soils for retention on site and the risks to human health. Therefore, additional assessment may be required to classify the soils for off-site disposal with testing criteria to assess whether the soil is hazardous, non-hazardous or inert waste. However, existing laboratory test certificates will help inform the process. Any additional testing (principally for asbestos) should also be used in the classification of the waste soils for off-site disposal.

2.7.2 The receiving landfill may require additional specialist laboratory testing to further characterise the material proposed for disposal against Waste Acceptance Criteria (WAC). We would recommend early consultation between the Contractor and the receiving landfill to determine any specific laboratory testing requirements.

2.7.3 Individuals/companies removing soils from the site are bound by a duty of care and as such this should only be undertaken by an authorised person. All waste movements should be accompanied by a waste transfer note.

## 2.8 Re-Use of Waste Soils on Site

2.8.1 The re-use of waste soils generated at the site should be covered though environmental permit exemptions (if applicable) and/or through the preparation of a Material Management Plan as part of compliance with the Definition of Waste: Code of Practice (DoW:CoP).

2.8.2 The re-use of any site won material will require an assessment to confirm a certainty of use.

# 3. VERIFICATION OF WORKS

## 3.1 Supervision of Works

3.1.1 An Engineer from BEK attended the site as requested by CG during the remediation works which were undertaken progressively. Regular liaison with CG during the works ensured a presence during key activities.

## 3.2 Capping System

3.2.1 Following the recommendations within the RMS, a capping system comprising 150 mm topsoil and 250 mm of subsoil has been installed to a depth of 400 mm in gardens. The capping system was placed on a geotextile marker layer.

*Imported Soil*

3.2.2 CG imported approximately 250 $m^3$ of topsoil from 'Marchington Stone Limited' and approximately 400 $m^3$ of subsoil from the Quarry on Dean House Lane, Outlane. The soils imported were inspected by an engineer from BEK who can confirm that there was no anthropogenic content and no visual/olfactory evidence for the presence of contamination and visually, the soils were fit for purpose.

3.2.3 Source testing for the topsoil and subsoil has been provided and reviewed by BEK (see Appendix B).

3.2.4 The imported topsoil and subsoil was also subject to validation testing and assessment on site in accordance with the RMS. To comply with the recommendations presented in the RMS, it was necessary to recover validation samples at a rate no less than '1 sample per 100 m3' of emplaced soils. BEK recovered a total of 9 topsoil and subsoil samples for chemical testing.

3.2.5 A summary of the imported soila is presented below.

| Source & Source Number | Volume | Description | Plots Used | Sample Names & Source Test Data Reference |
|---|---|---|---|---|
| Marchingtons Topsoil | 250 $m^3$ | Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlets | 1-20 & POS | TS-1 to TS-9 |
| Quarry on Den House Lane Subsoil | 400 $m^3$ | Light brown very gravely slightly clayey SAND | 1-20 & POS | SS-1 to SS-9 |

***Table 1:*** *Imported Topsoil and Subsoil Information*

3.2.6 The samples were tested for the contaminants of concern listed in the RMS. Following a review of the chemical test results, no elevations against human health thresholds were identified and the soils are confirmed to be suitable for use in private gardens and shared landscaped areas of the site. Copies of these test results are presented in Appendix C.

3.2.7 Capping layer thickness was checked by BEK within the garden areas to ensure the required thickness has been achieved. The validation of these private gardens was done on a plot-by-plot basis.

3.2.8 This was undertaken by measuring within the excavation of hand dug trial holes to ensure the correct construction of the capping system (including the presence of the geotextile membrane) and confirm capping thickness.

3.2.9 The presence of geotextile membrane was confirmed at the base of the trial holes within each of the plots during our visits.

3.2.10 See photographs in Appendix D.

3.2.11 On completion of the verification for the capping system in each plot, BEK prepared a Certificate of Completion for that plot.

3.2.12 Certificates of Completion are available for each plot. All certificates presented in Appendix A for information.

## 3.3 Unrecorded Contamination & Associated Issues

3.3.1 The groundworkers did not report any visual or olfactory evidence of contamination impacted soils during any excavations.

## 3.4 Local Authority Correspondence

3.4.1 The following response is provided by BEK at the request of the client following review of the email dated 2nd April 2025 sent by Katie Raw – Planning Officer – Planning Building Control and Licensing – Manchester City Council.

Point 1

3.4.2 **Planning Officer:** We still need comment / validation regarding the clean services corridor for the water supply pipe pipes as it was stated in the UK water supplier risk assessment that new PE pipes were to be lain in clean material so this will need validating.

3.4.3 **Response:** Please note that the validation of clean service corridor for the water supplies and the gas protection instillation validation reports was carried out by a third party.

3.4.4 Validation of the clean services corridor for the water supply pipe pipes has been carried out by Bethell Civils Utilities. Bethell Civils has provided a series photographs showing that PE pipes haven been laid in purpose excavated trenches backfill with red sand sourced from Marchington Stone. The photographs provided by Bethell Civils are presented in Appendix E.

Point 2

3.4.5 **Planning Officer:** We will also require the gas protection installation validation report to verify that the remediation measures outlined in the remediation report BEK-23104-2 (Rev A) with regard to gas protection measures have been installed and fully complied with.

3.4.6 **Response:** The validation of the ground gas mitigation measures have been completed by Betts Geo Consulting Engineers. The validation information prepared be Betts Geo is presented in Appendix F.

# 4. CONCLUSIONS

4.1 BEK has supervised the implementation of the garden remediation works for the development at land at Benmore Road, Blackley.

4.2 The installation of the gas mitigation measures has been validated by Betts Geo and their validatory information is presented herein.

4.3 All remediation works have been carried out by The Casey Group and their appointed contractors, in accordance with the approved Remediation Method Statement.

# APPENDIX A

Garden Capping Certificates

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

Our Ref: BEK/23104/241211/CG/1

11th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 1

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND*'. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

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Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 1 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

**BEK Geo-Environmental Consulting**
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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

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MIchael D Joyce Associates LLP

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# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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The results included within the report relate only to the sample(s) submitted for testing.

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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

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

# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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**i2 Analytical**
7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

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The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

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Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

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The result for sum should be interpreted with caution

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# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

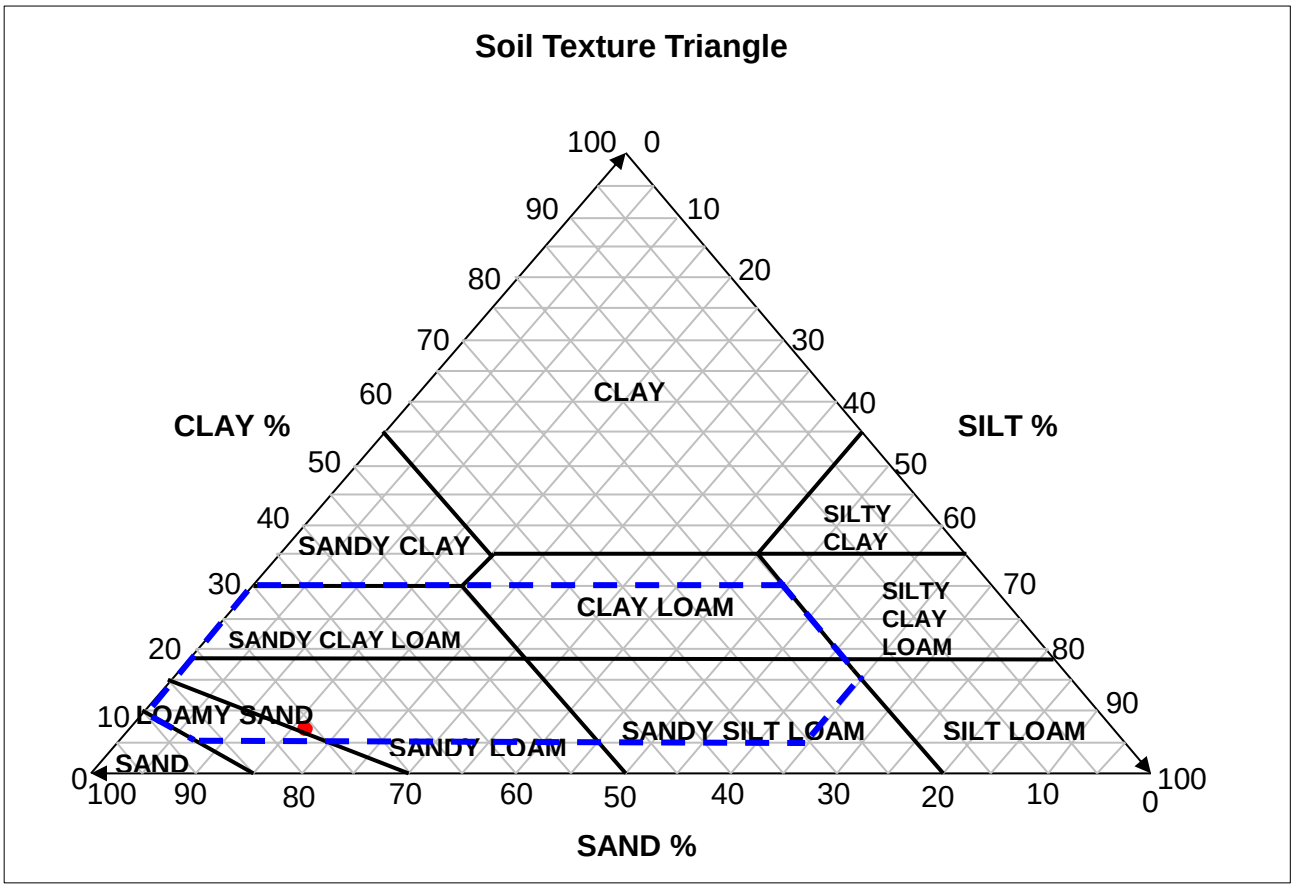
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

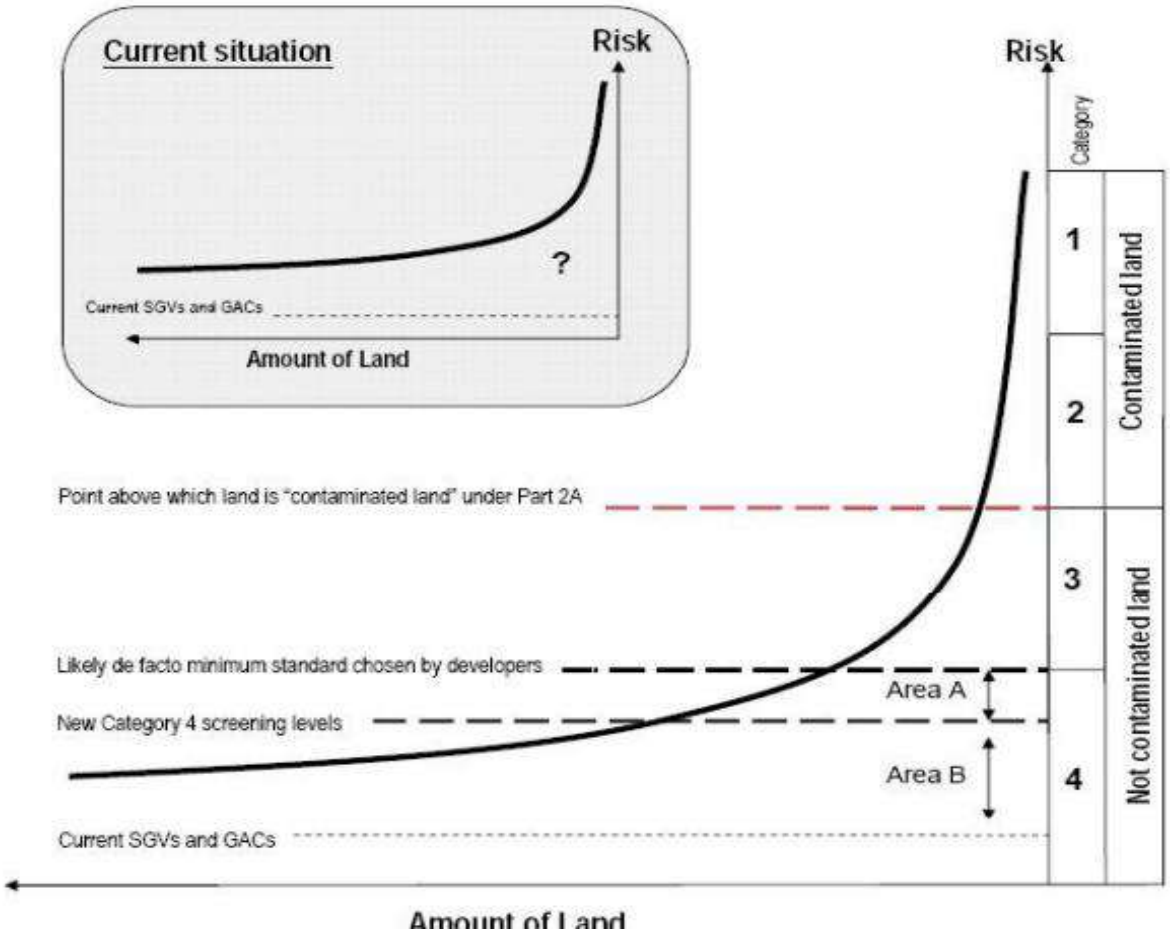
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

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# ANNEX B

## Chemical Test Results

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Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

mbuckley@bekenviro.co.uk
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**01254 377622**

# ANNEX C

Photographs

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
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**01254 377622**




Photograph 1: Validation of Garden Capping



Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Photograph 3: Validation of Garden Capping




Photograph 4: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

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Photograph 5: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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**01254 377622**

Our Ref: BEK/23104/241211/CG/2

11th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 2

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND*'. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 2 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

**BEK Geo-Environmental Consulting**
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Lancashire BB5 5TU

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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

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**Partners:** Anthony D Joyce BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP
Lucie A M Joyce BSc (Hons) Edward L H Joyce BSc (Hons)

MIchael D Joyce Associates LLP

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Watford,
Herts,
WD18 8YS

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

# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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The results included within the report relate only to the sample(s) submitted for testing.

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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

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

# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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**i2 Analytical**
7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

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The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

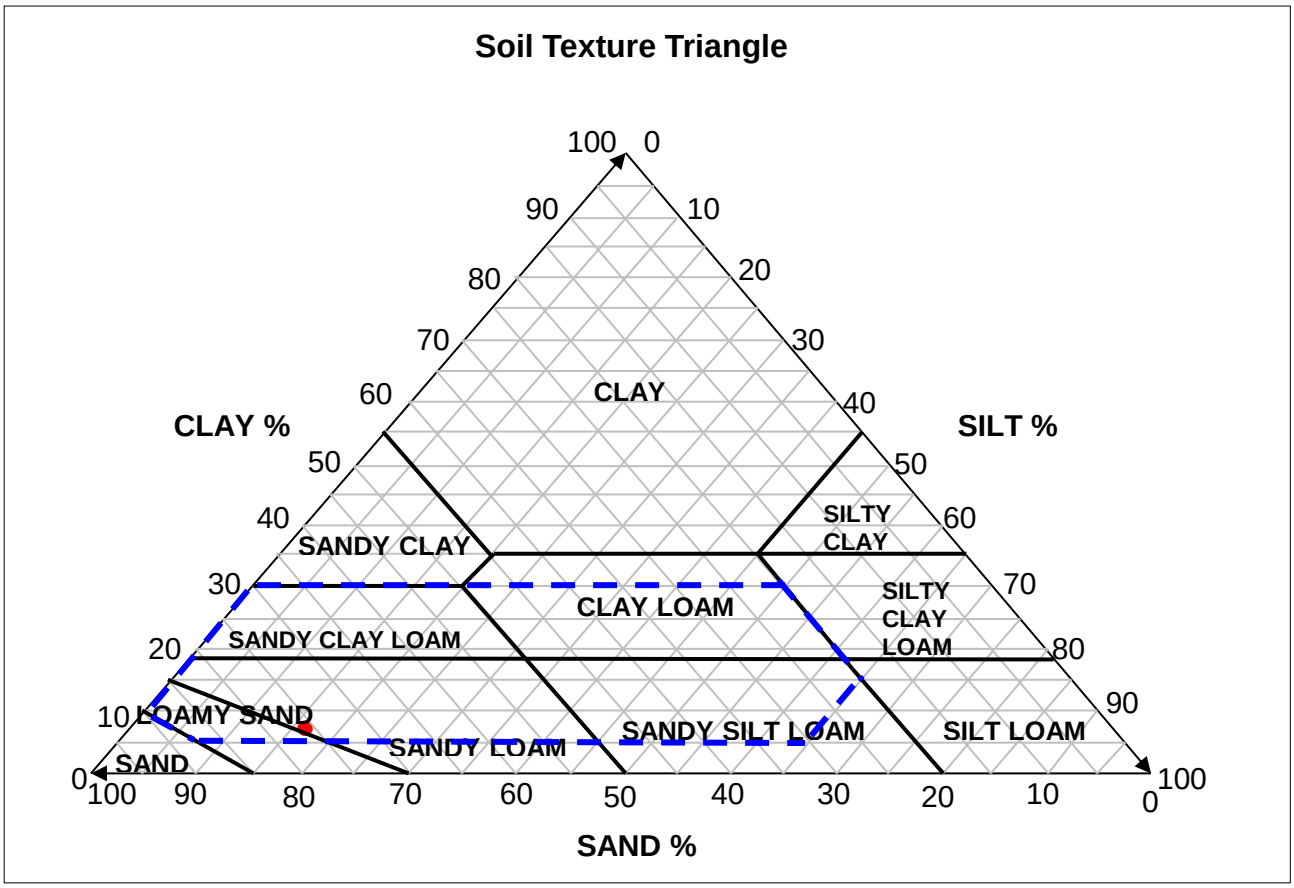
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

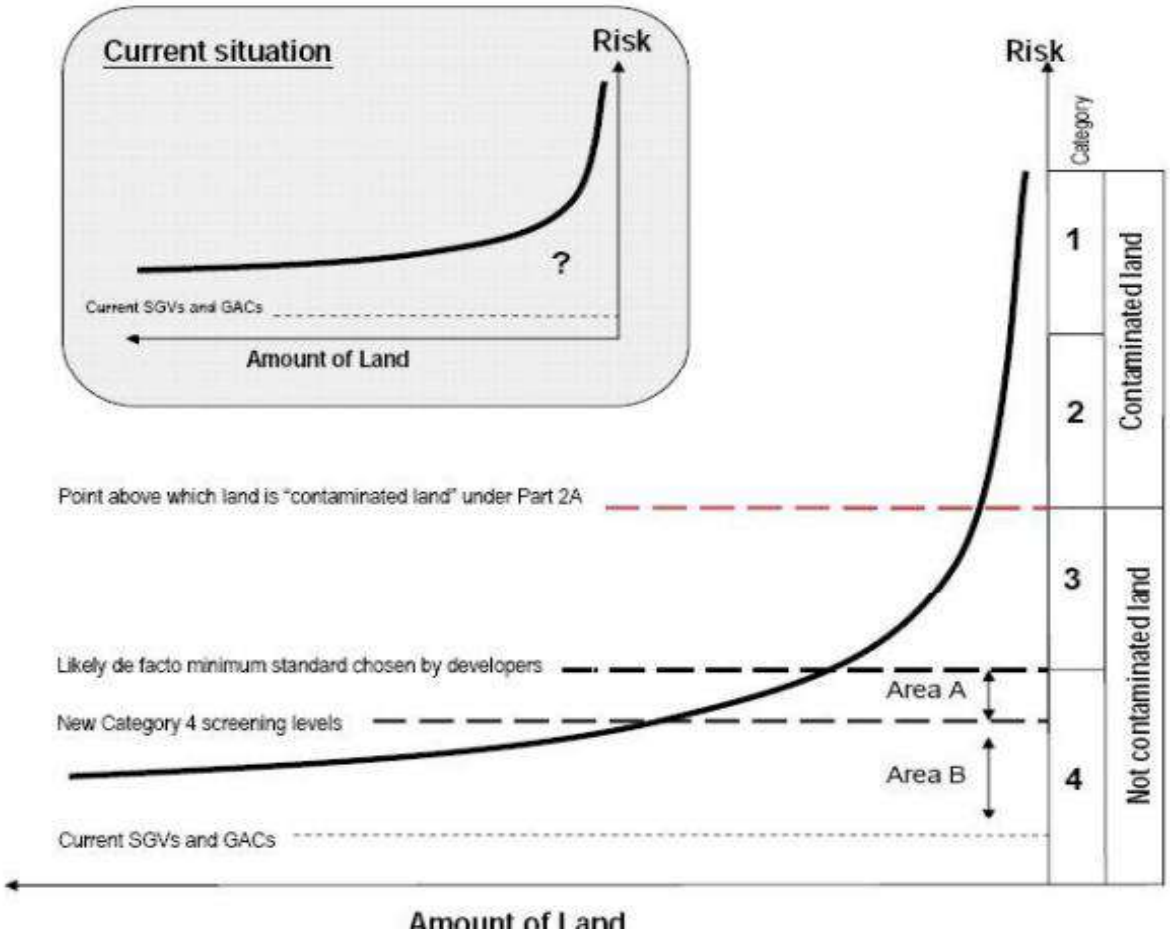
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

*Ebony Gheorghe*
*BSc MSc*
*Soil Scientist*

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX B

## Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX C

Photographs

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**




Photograph 1: Validation of Garden Capping



Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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**01254 377622**




Photograph 3: Validation of Garden Capping




Photograph 4: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
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Photograph 5: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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**01254 377622**

GEO-ENVIRONMENTAL CONSULTING

Our Ref: BEK/23104/241211/CG/3

11th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 3

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND*'. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

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bekenviro.co.uk
**01254 377622**

Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 3 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

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**Partners:** Anthony D Joyce BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP
Lucie A M Joyce BSc (Hons) Edward L H Joyce BSc (Hons)

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

# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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The results included within the report relate only to the sample(s) submitted for testing.

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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

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

# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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**i2 Analytical**
7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

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The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

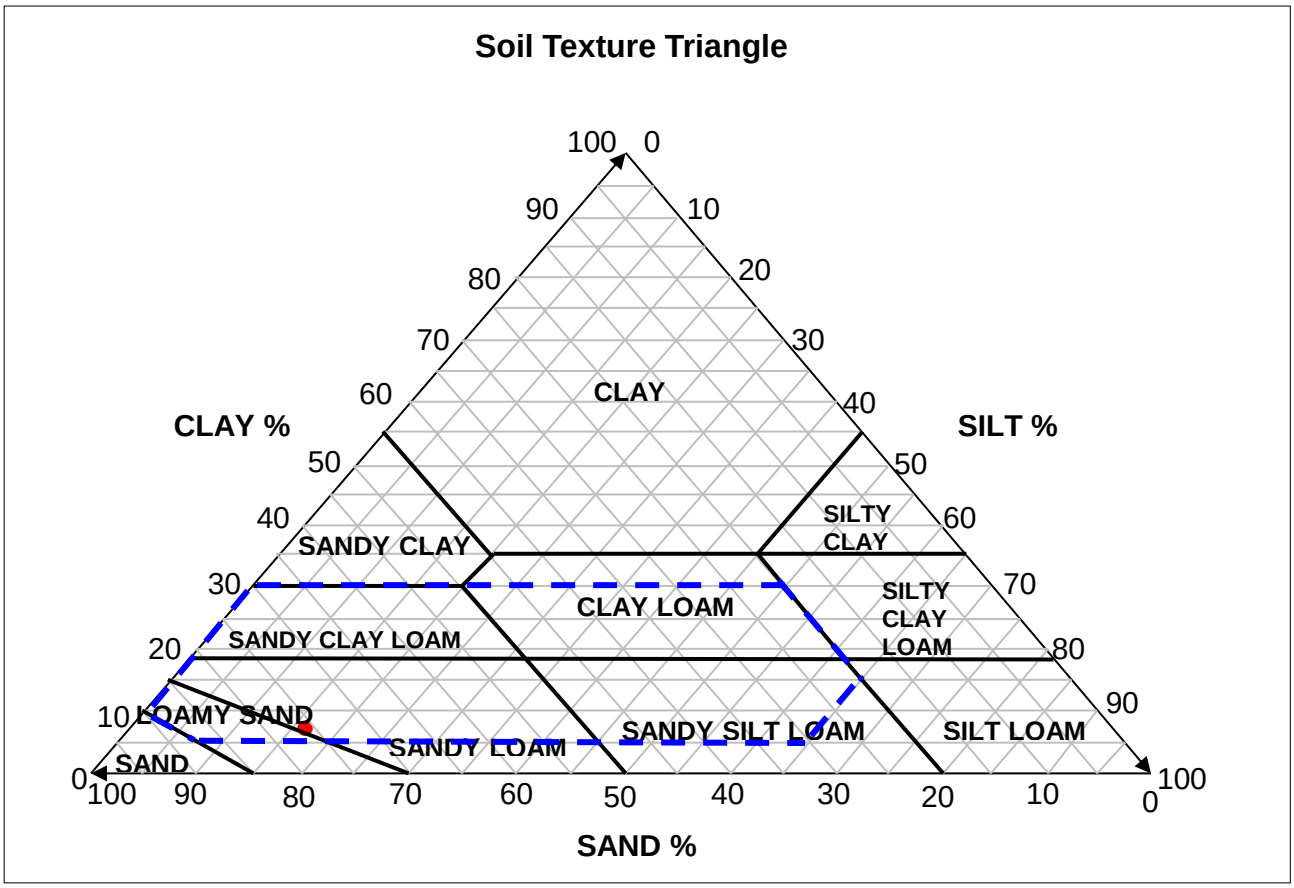
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

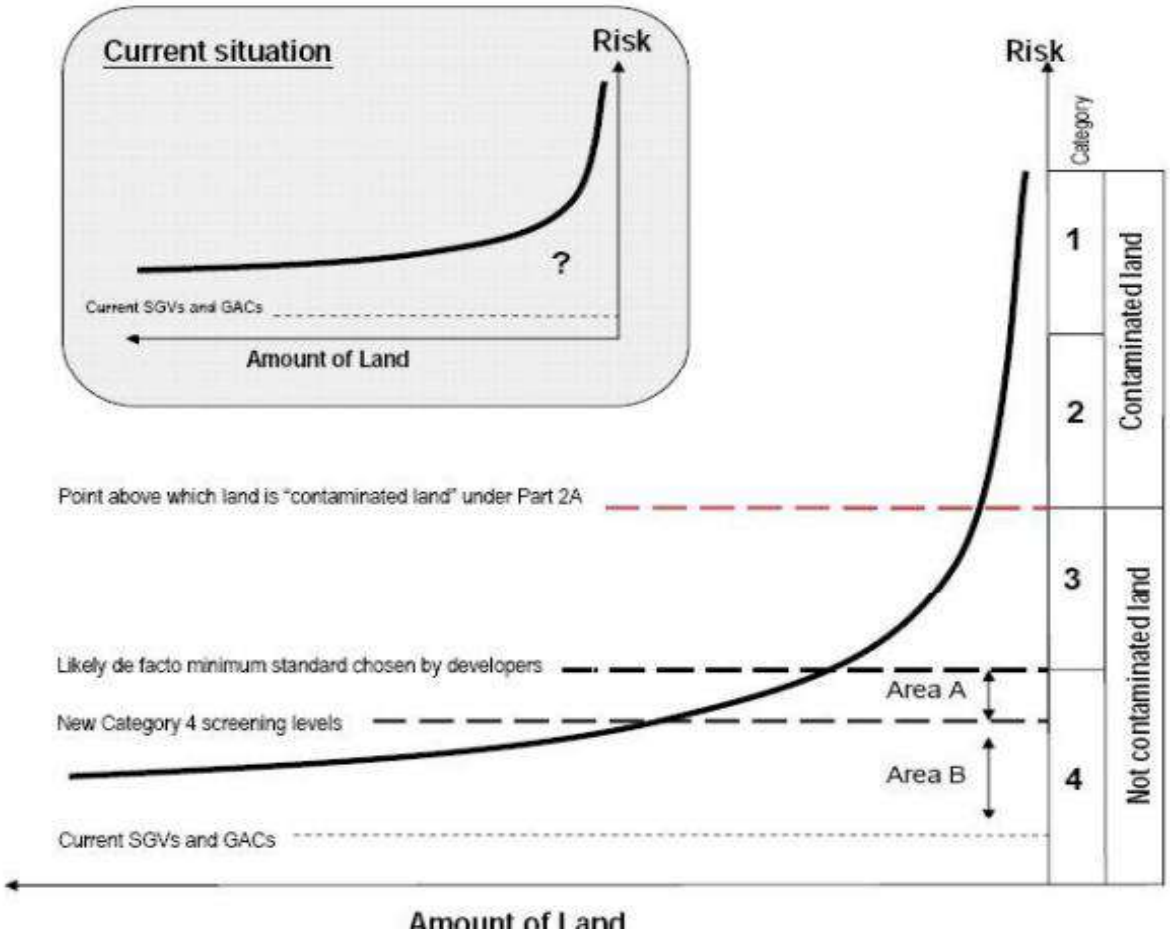
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

*Ebony Gheorghe*
*BSc MSc*
*Soil Scientist*

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX B

## Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

mbuckley@bekenviro.co.uk
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**01254 377622**

# ANNEX C

Photographs

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park, Lancashire BB5 5TU

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**01254 377622**




Photograph 1: Validation of Garden Capping




Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Photograph 3: Validation of Garden Capping




Photograph 4: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Photograph 5: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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GEO-ENVIRONMENTAL CONSULTING

Our Ref: BEK/23104/241218/CG/4

18th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 4

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND'*. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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bekenviro.co.uk
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Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 4 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

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i2 Analytical Ltd.
7 Woodshots Meadow,
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# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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Business Park,
Watford,
Herts,
WD18 8YS

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**f:** 01923 237404
**e:** reception@i2analytical.com

# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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**i2 Analytical**
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Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

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The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

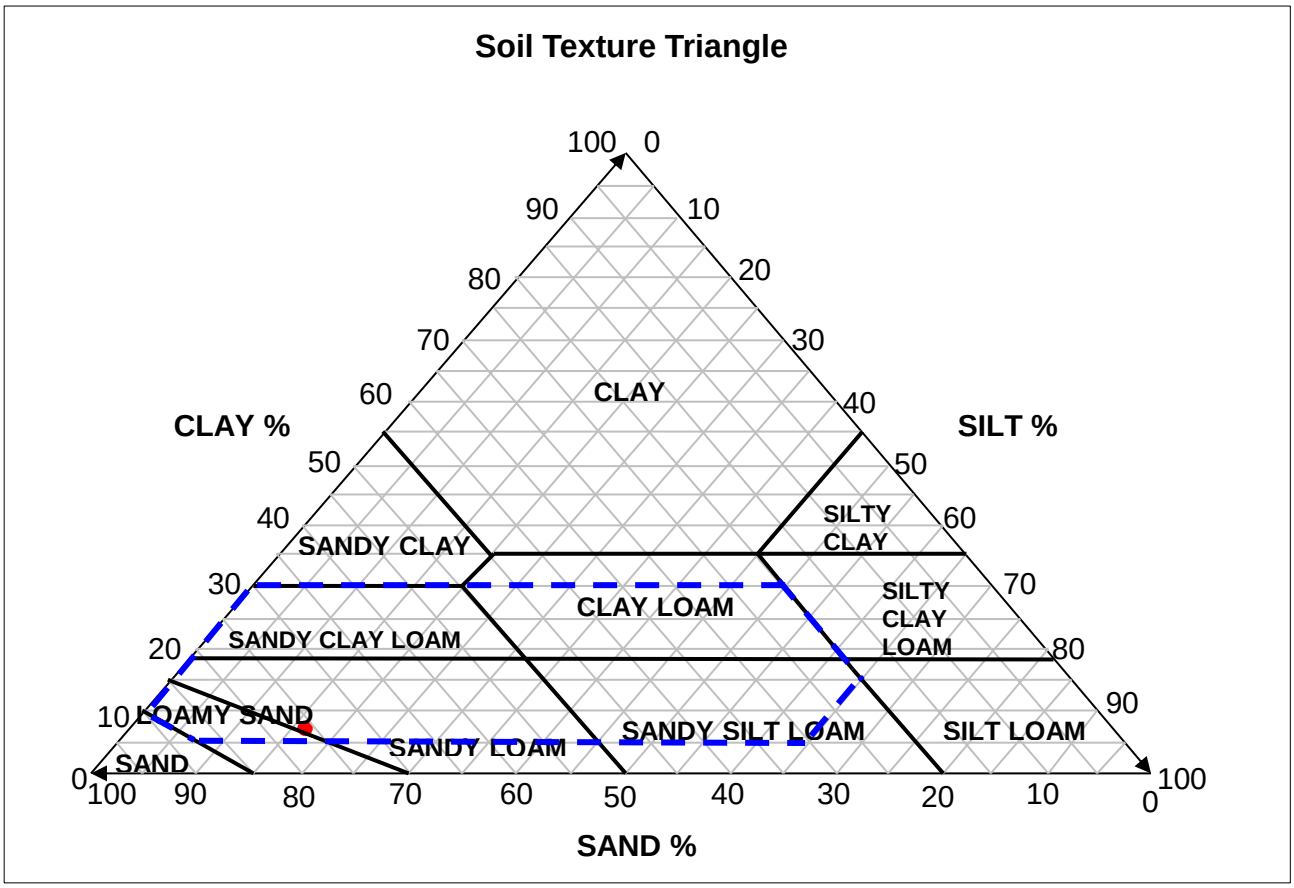
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

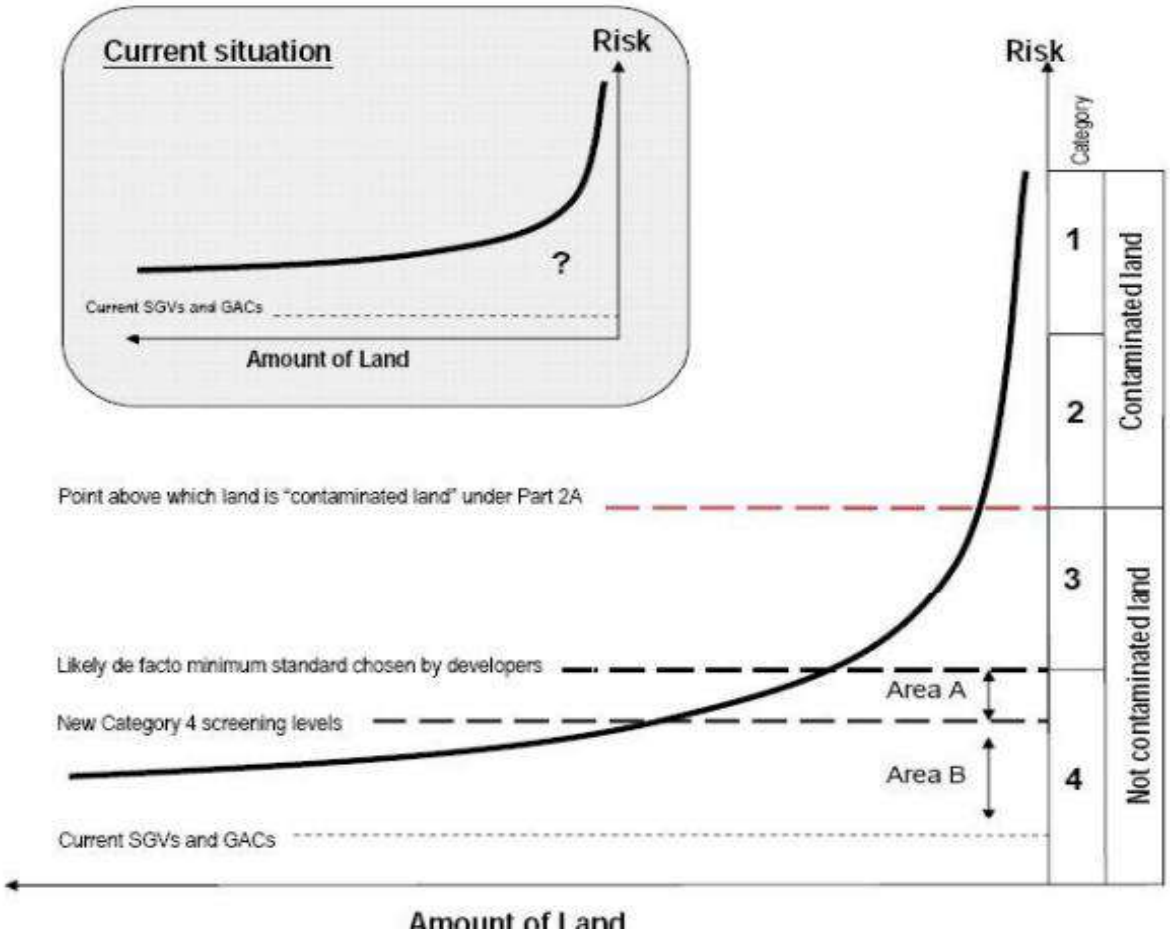
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

*Ebony Gheorghe*
*BSc MSc*
*Soil Scientist*

**BEK Geo-Environmental Consulting**
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Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
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**01254 377622**

# ANNEX B

## Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX C

Photographs

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

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Photograph 1: Validation of Garden Capping



Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Photograph 3: Validation of Garden Capping



Photograph 4: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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GEO-ENVIRONMENTAL CONSULTING

Our Ref: BEK/23104/241218/CG/5

18th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 5

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND'*. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

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bekenviro.co.uk
**01254 377622**

Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 5 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

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**Partners:** Anthony D Joyce BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP
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MIchael D Joyce Associates LLP

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# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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The results included within the report relate only to the sample(s) submitted for testing.

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

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

# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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**i2 Analytical**
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Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

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The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

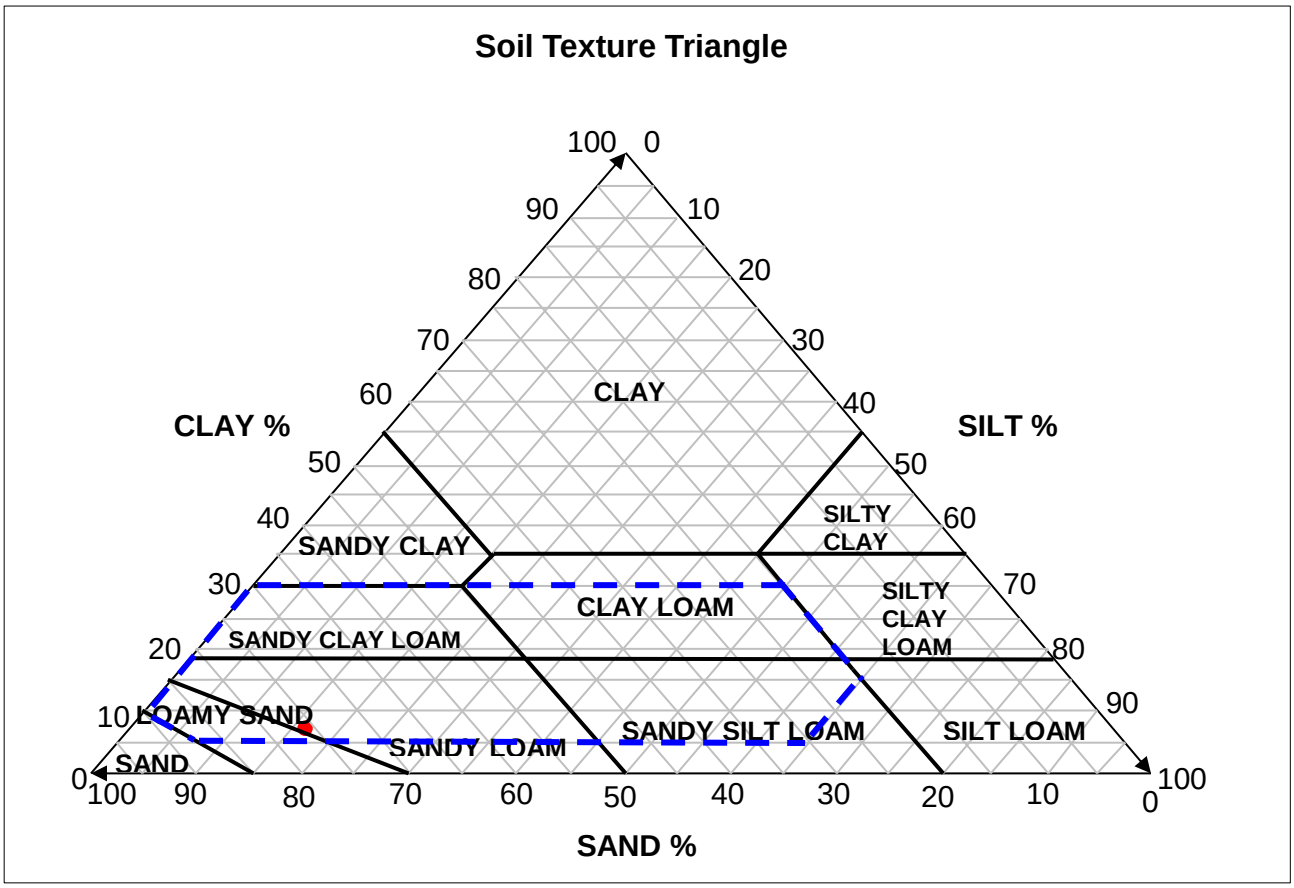
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

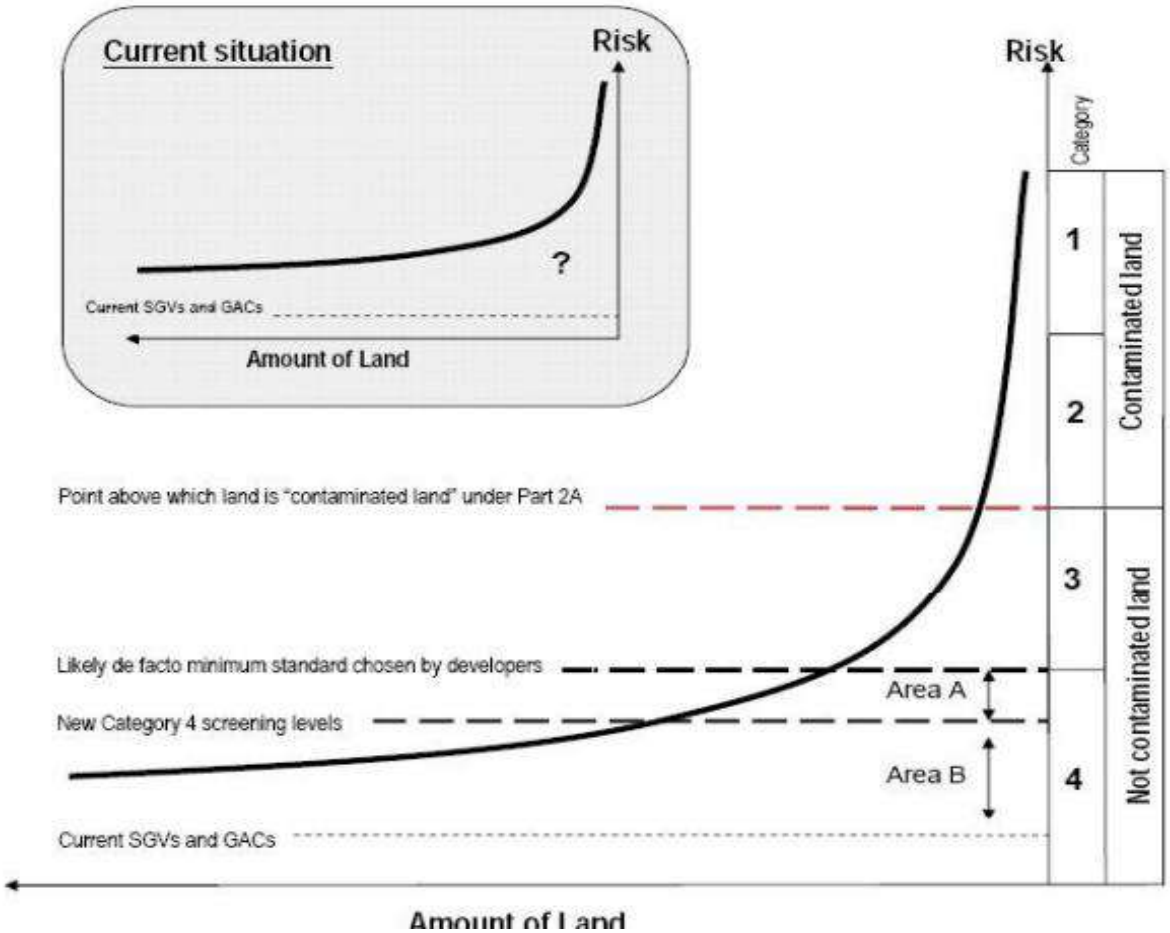
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

*Ebony Gheorghe*
*BSc MSc*
*Soil Scientist*

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**01254 377622**

# ANNEX B

## Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX C

Photographs

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**




Photograph 1: Validation of Garden Capping



Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**



Photograph 3: Validation of Garden Capping




Photograph 4: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

GEO-ENVIRONMENTAL CONSULTING

Our Ref: BEK/23104/241218/CG/6

18th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 6

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND'*. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 6 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

**BEK Geo-Environmental Consulting**
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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

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**Partners:** Anthony D Joyce BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP
Lucie A M Joyce BSc (Hons) Edward L H Joyce BSc (Hons)

MIchael D Joyce Associates LLP

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**e:** reception@i2analytical.com

# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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

MIchael D Joyce Associates LLP

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**e:** reception@i2analytical.com

# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report relate only to the sample(s) submitted for testing.

**i2 Analytical**
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Watford, WD18 8YS

Telephone: 01923 225404
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# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

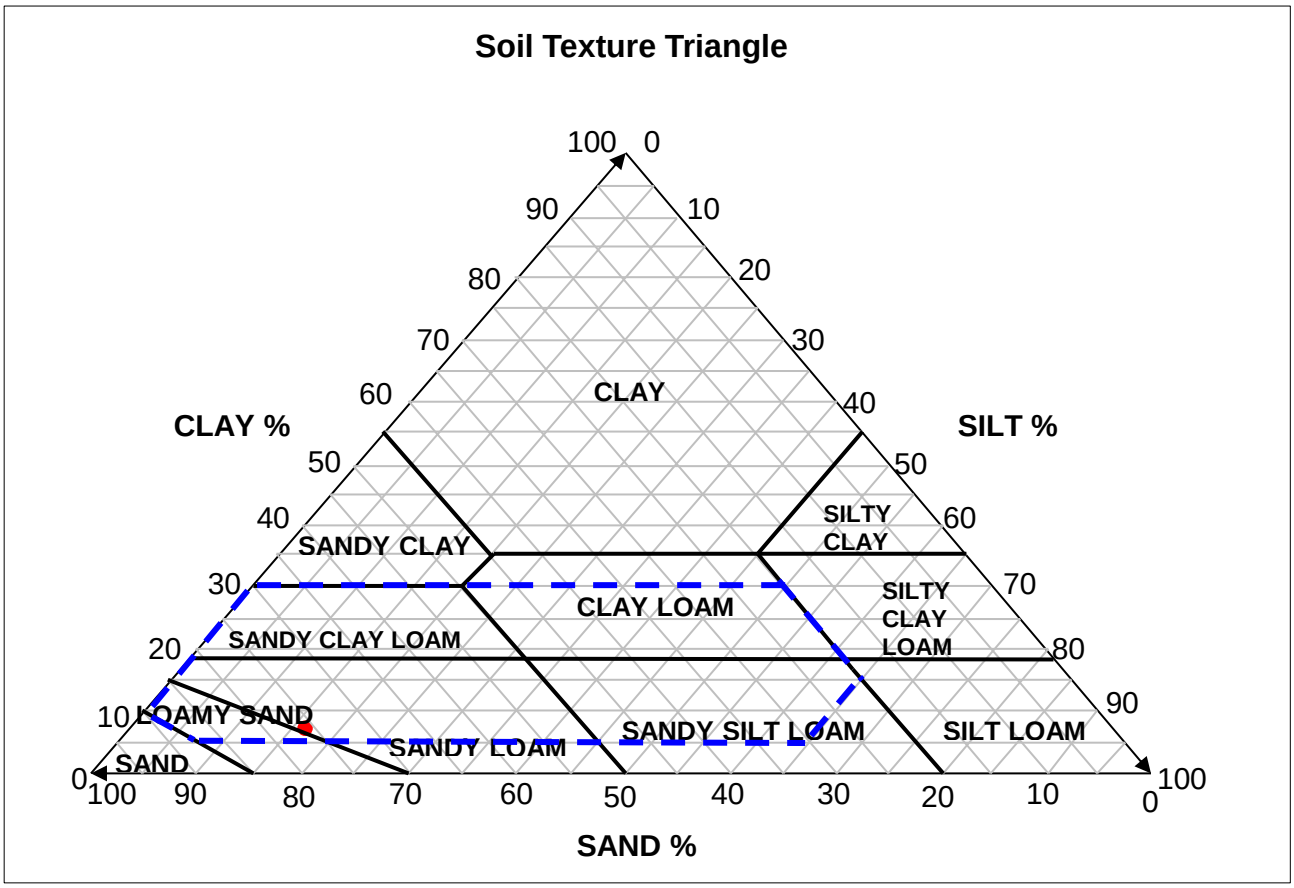
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

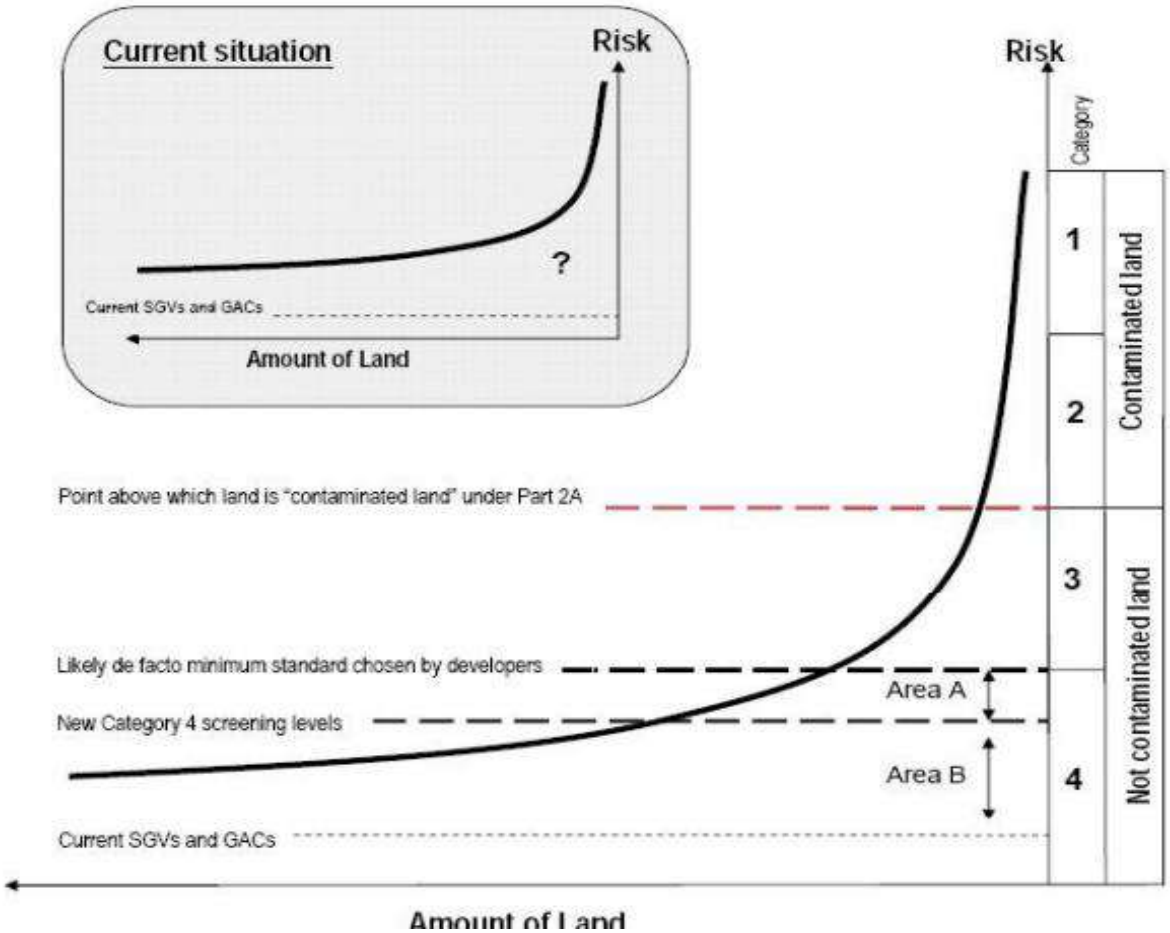
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

*Ebony Gheorghe*
*BSc MSc*
*Soil Scientist*

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**01254 377622**

# ANNEX B

## Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
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| Subscript "A" | Analysis performed on as-received Sample |
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| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

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All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
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All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

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For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX C

Photographs

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
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Photograph 1: Validation of Garden Capping




Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

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Photograph 3: Validation of Garden Capping



Photograph 4: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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GEO-ENVIRONMENTAL CONSULTING

Our Ref: BEK/23104/241218/CG/7

18th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 7

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND'*. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 7 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

**BEK Geo-Environmental Consulting**
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Lancashire BB5 5GY

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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

Registered Office: 531 Denby Dale Road West, Calder Grove, WF4 3ND UK (Reg No. OC 302905)
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**Partners:** Anthony D Joyce BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP
Lucie A M Joyce BSc (Hons) Edward L H Joyce BSc (Hons)

MIchael D Joyce Associates LLP

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# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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Business Park,
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# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report relate only to the sample(s) submitted for testing.

**i2 Analytical**
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Watford, WD18 8YS

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# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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

# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

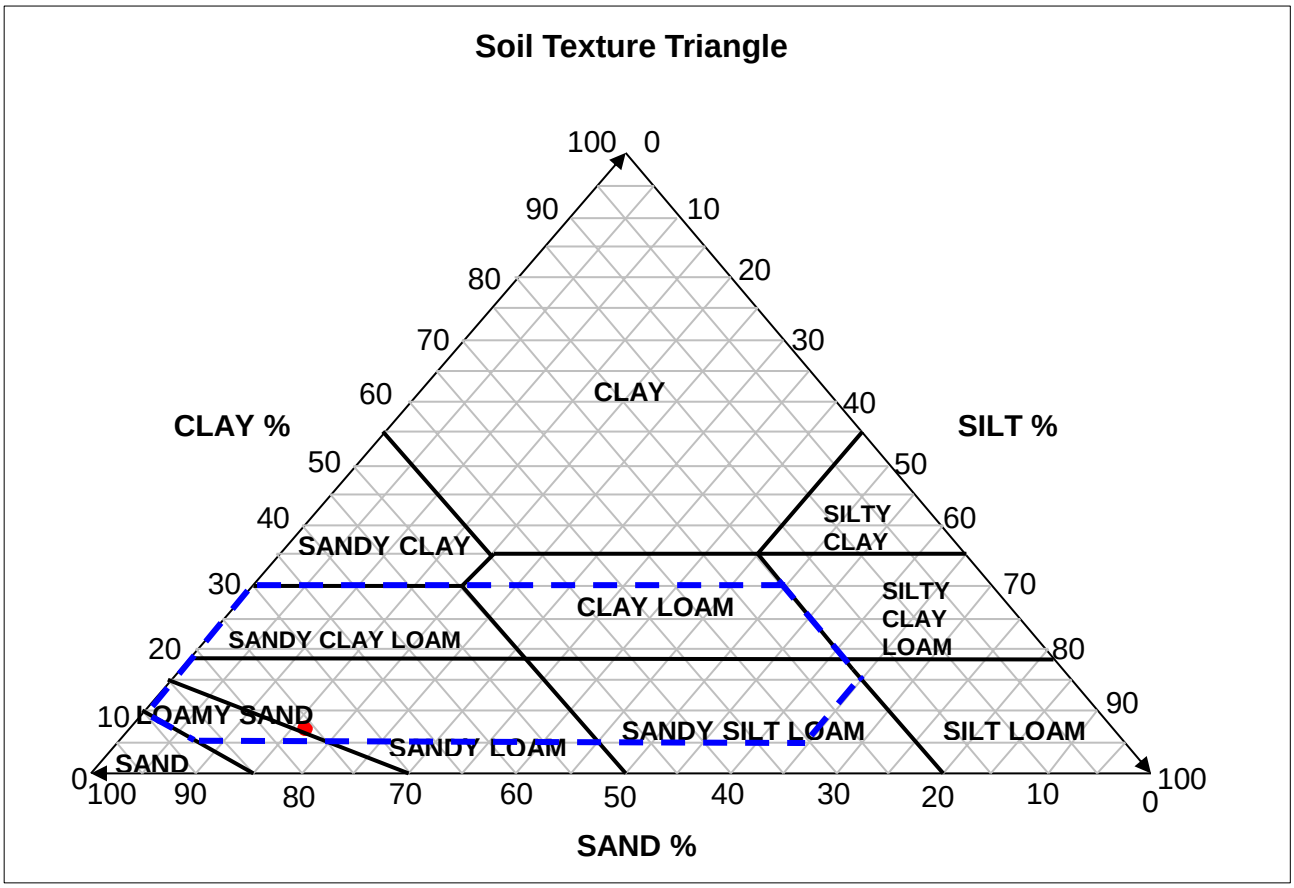
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

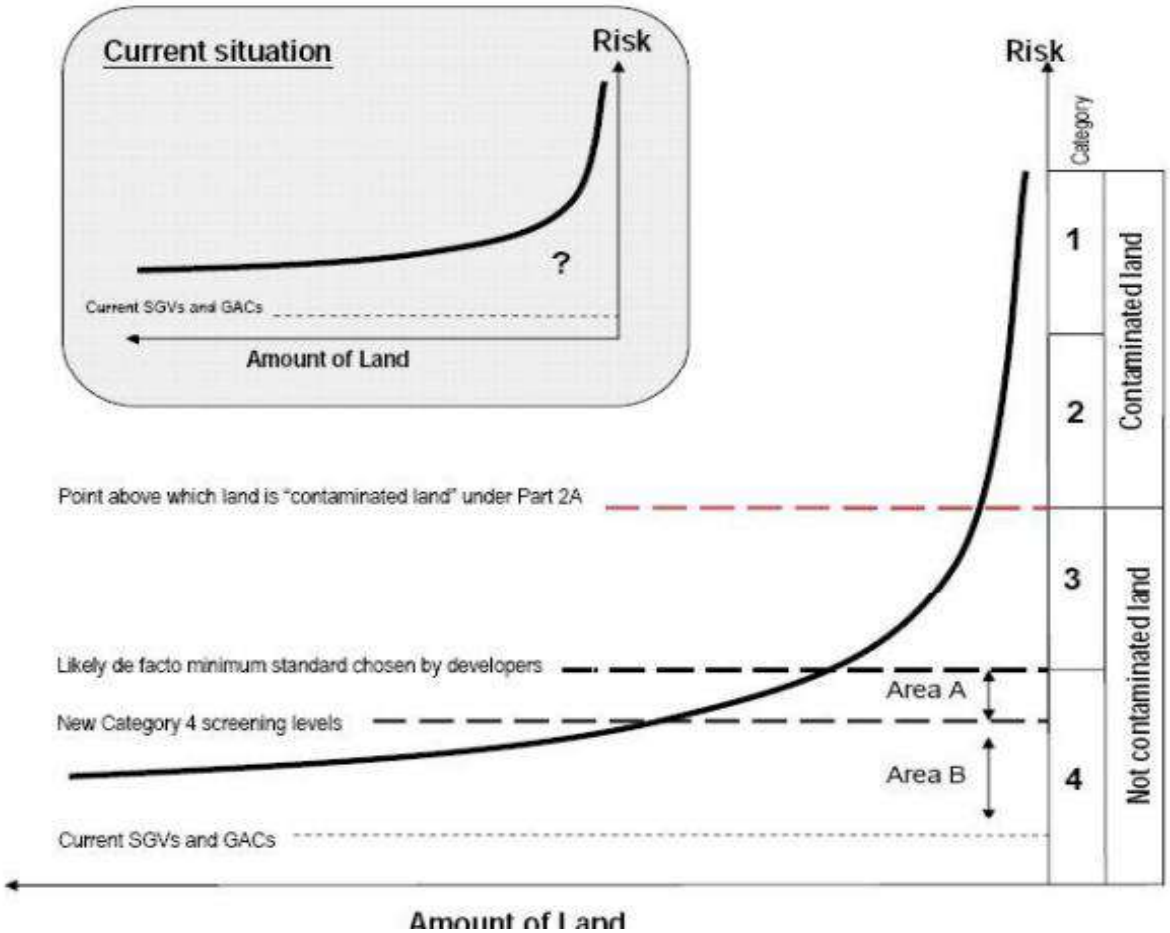
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

*Ebony Gheorghe*
*BSc MSc*
*Soil Scientist*

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**01254 377622**

# ANNEX B

## Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

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•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
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•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
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For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
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Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

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# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX C

Photographs

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
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Photograph 1: Validation of Garden Capping



Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

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Photograph 3: Validation of Garden Capping



Photograph 4: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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GEO-ENVIRONMENTAL CONSULTING

Our Ref: BEK/23104/241218/CG/8

18th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 8

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND'*. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 8 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

Registered Office: 531 Denby Dale Road West, Calder Grove, WF4 3ND UK (Reg No. OC 302905)
**T** +44(0)1924 360458 **E** mdja@geoenvironmental.co.uk **W** www.geoenvironmental.co.uk
**Partners:** Anthony D Joyce BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP
Lucie A M Joyce BSc (Hons) Edward L H Joyce BSc (Hons)

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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The results included within the report relate only to the sample(s) submitted for testing.

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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**e:** reception@i2analytical.com

# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report relate only to the sample(s) submitted for testing.

**i2 Analytical**
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Watford, WD18 8YS

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email:reception@i2analytical.com

# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
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**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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The results included within the report relate only to the sample(s) submitted for testing.

# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

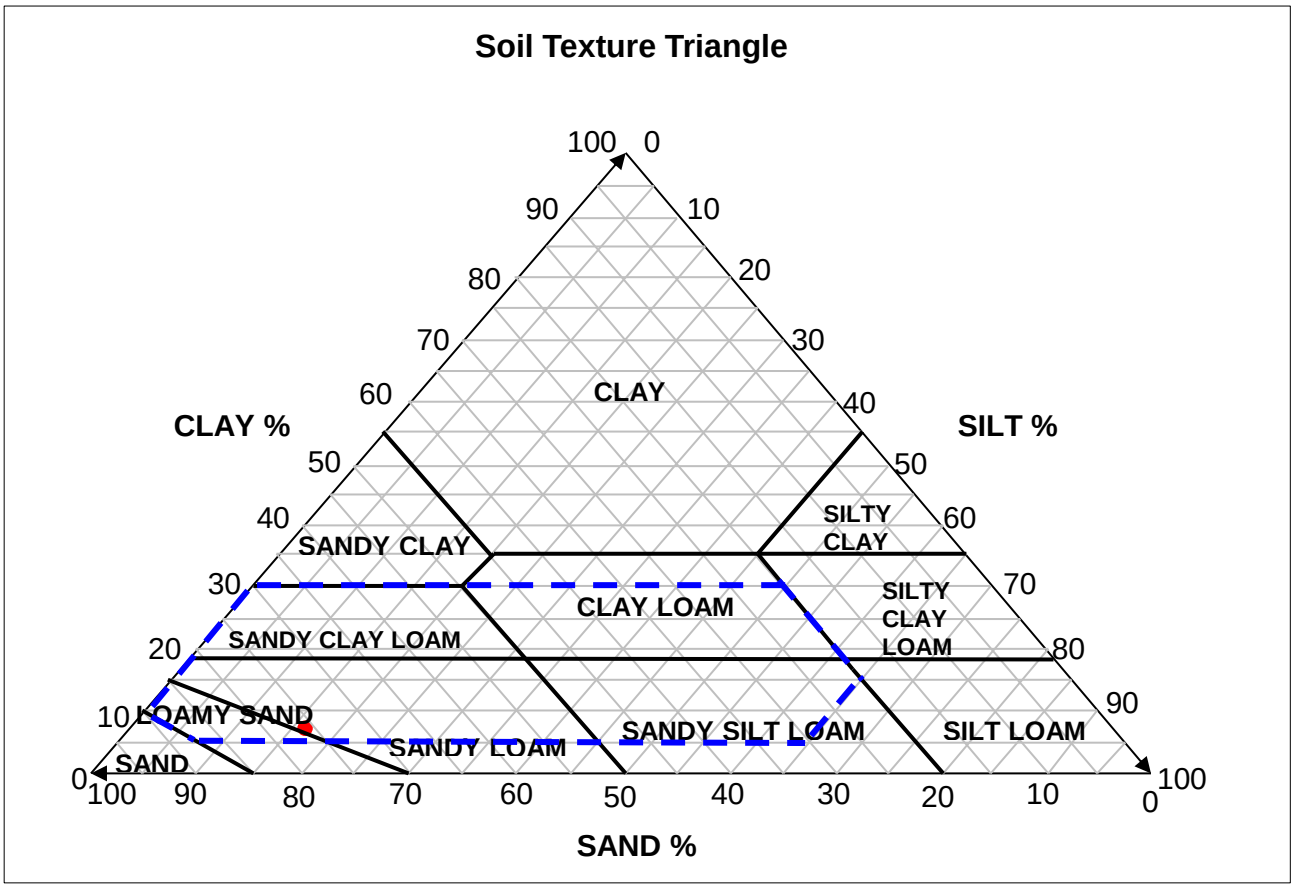
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

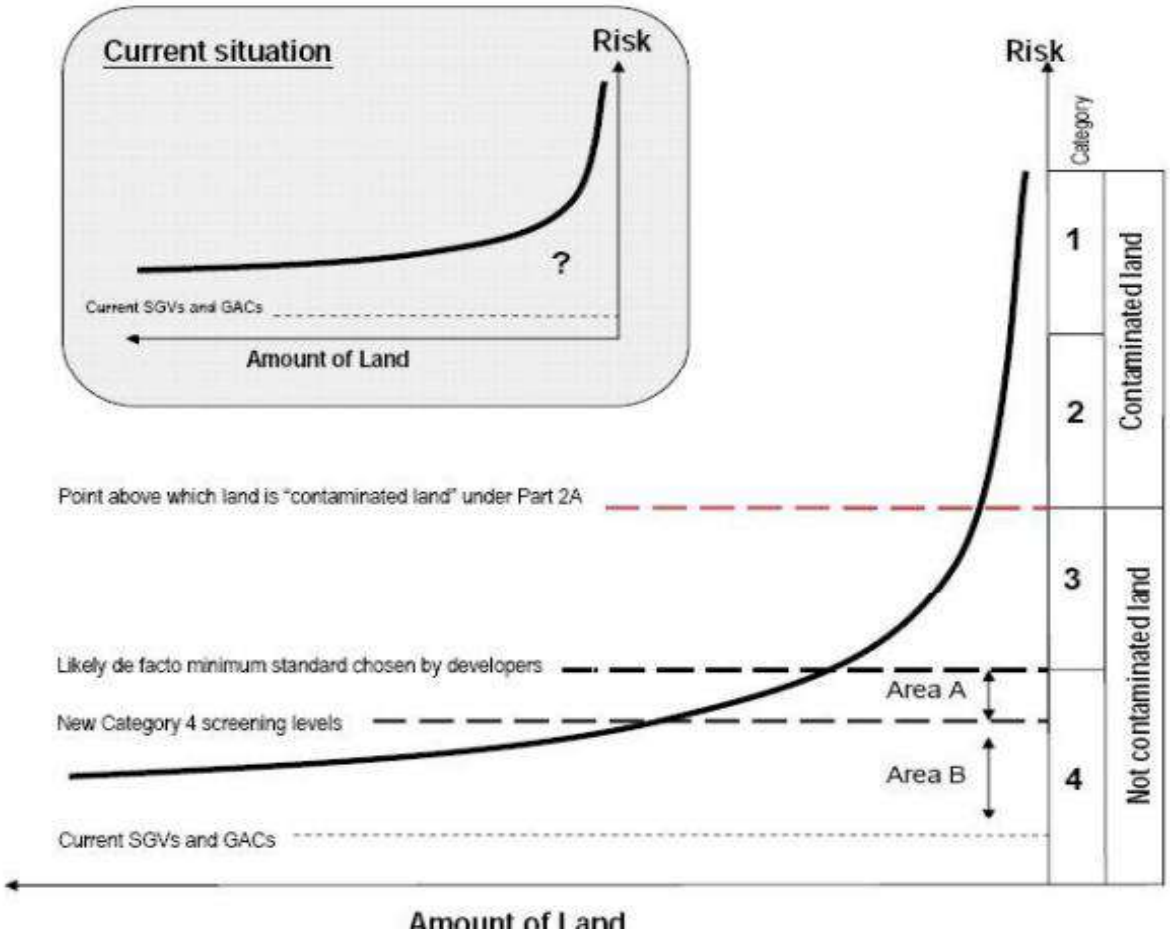
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

*Ebony Gheorghe*
*BSc MSc*
*Soil Scientist*

**BEK Geo-Environmental Consulting**
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Lancashire BB5 5GY

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**01254 377622**

# ANNEX B

## Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

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•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
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•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk
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**01254 377622**

# ANNEX C

Photographs

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

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Photograph 1: Validation of Garden Capping



Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

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Photograph 3: Validation of Garden Capping



Photograph 4: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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GEO-ENVIRONMENTAL CONSULTING

Our Ref: BEK/23104/241211/CG/9

11th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 9

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND*'. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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**01254 377622**

Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 9 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

**BEK Geo-Environmental Consulting**
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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

Registered Office: 531 Denby Dale Road West, Calder Grove, WF4 3ND UK (Reg No. OC 302905)
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**Partners:** Anthony D Joyce BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP
Lucie A M Joyce BSc (Hons) Edward L H Joyce BSc (Hons)

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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Business Park,
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# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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The results included within the report relate only to the sample(s) submitted for testing.

MIchael D Joyce Associates LLP

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# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**i2 Analytical**
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Watford, WD18 8YS

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# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

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The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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The results included within the report relate only to the sample(s) submitted for testing.

# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

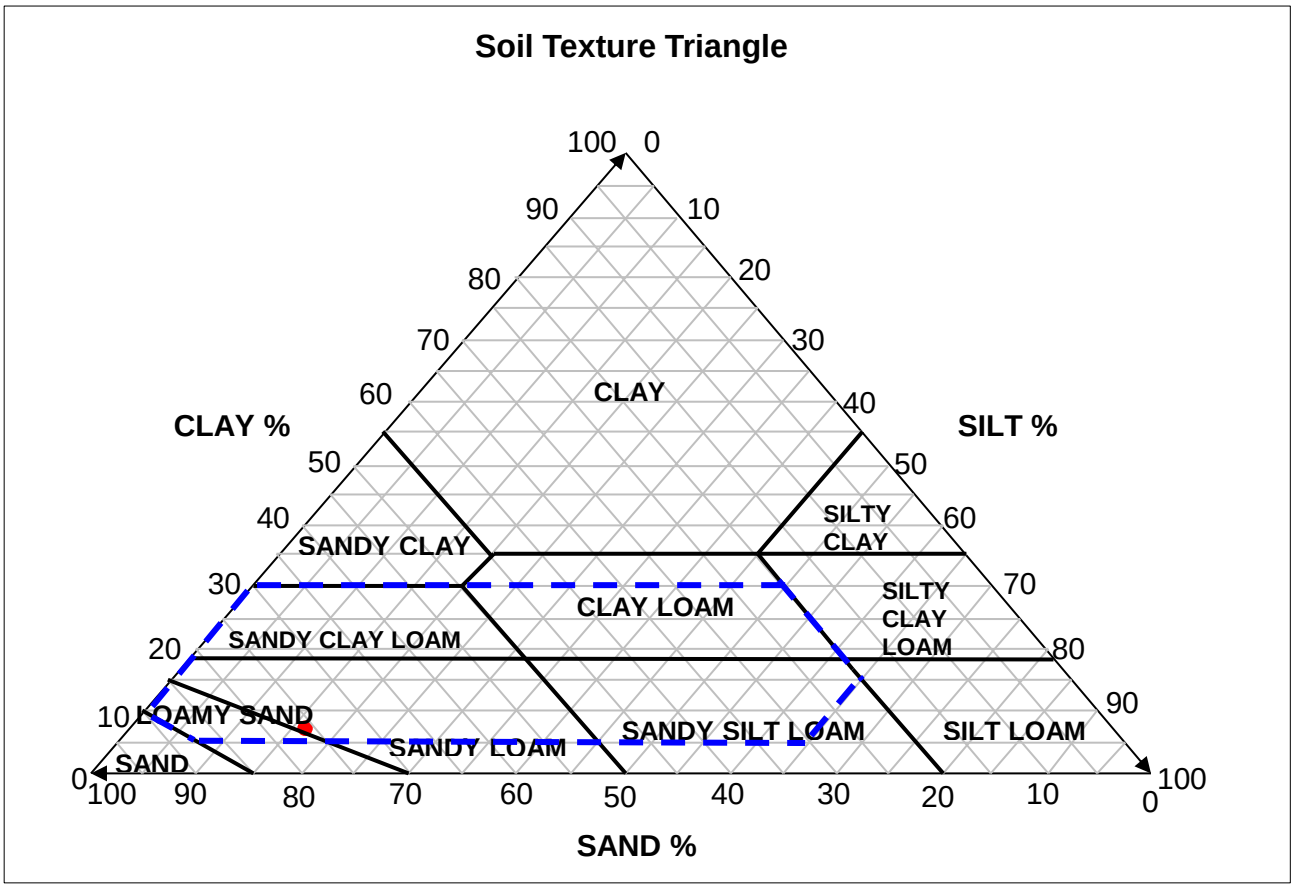
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

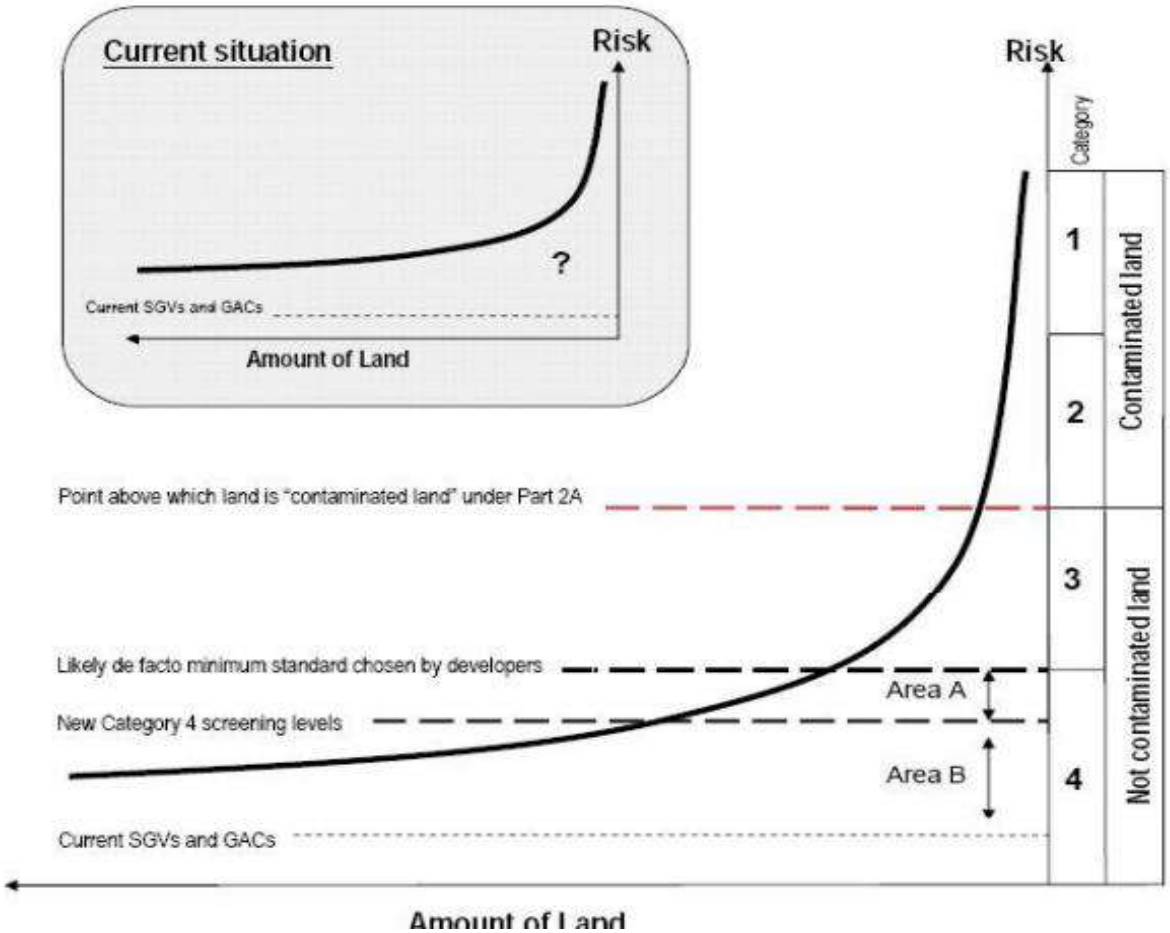
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

*Ebony Gheorghe*
*BSc MSc*
*Soil Scientist*

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**01254 377622**

# ANNEX B

## Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

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•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX C

Photographs

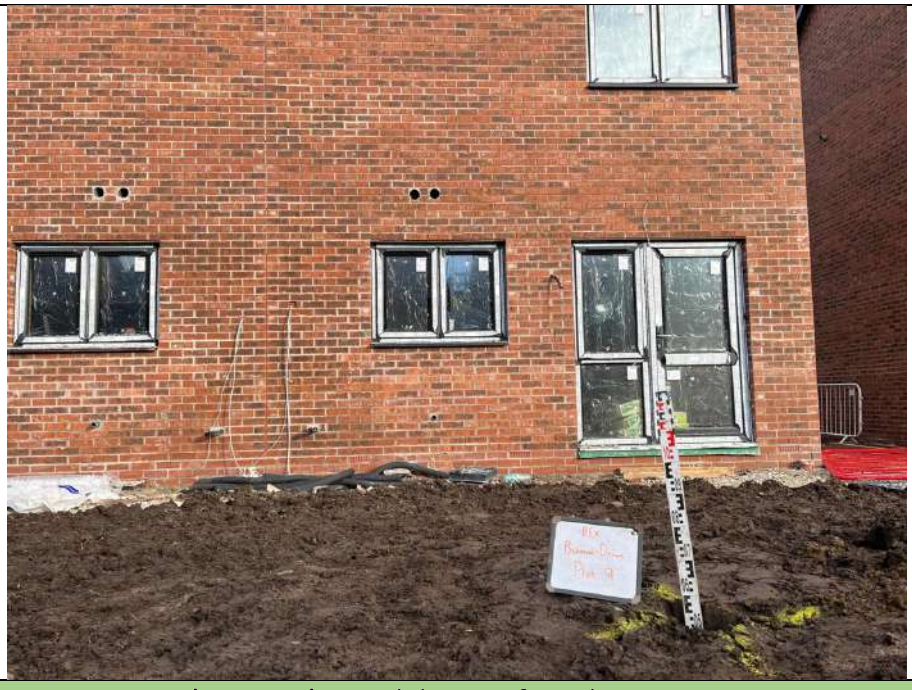
GEO-ENVIRONMENTAL CONSULTING

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Photograph 1: Validation of Garden Capping



Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

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Photograph 3: Validation of Garden Capping




Photograph 4: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Photograph 5: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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GEO-ENVIRONMENTAL CONSULTING

Our Ref: BEK/23104/241211/CG/10

11th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 10

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND*'. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

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Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 10 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

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Lancashire BB5 5TU

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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

Registered Office: 531 Denby Dale Road West, Calder Grove, WF4 3ND UK (Reg No. OC 302905)
**T** +44(0)1924 360458 **E** mdja@geoenvironmental.co.uk **W** www.geoenvironmental.co.uk
**Partners:** Anthony D Joyce BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP
Lucie A M Joyce BSc (Hons) Edward L H Joyce BSc (Hons)

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

**t:** 01923 225404
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**e:** reception@i2analytical.com

# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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

**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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**e:** reception@i2analytical.com

# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report relate only to the sample(s) submitted for testing.

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email:reception@i2analytical.com

# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

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The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

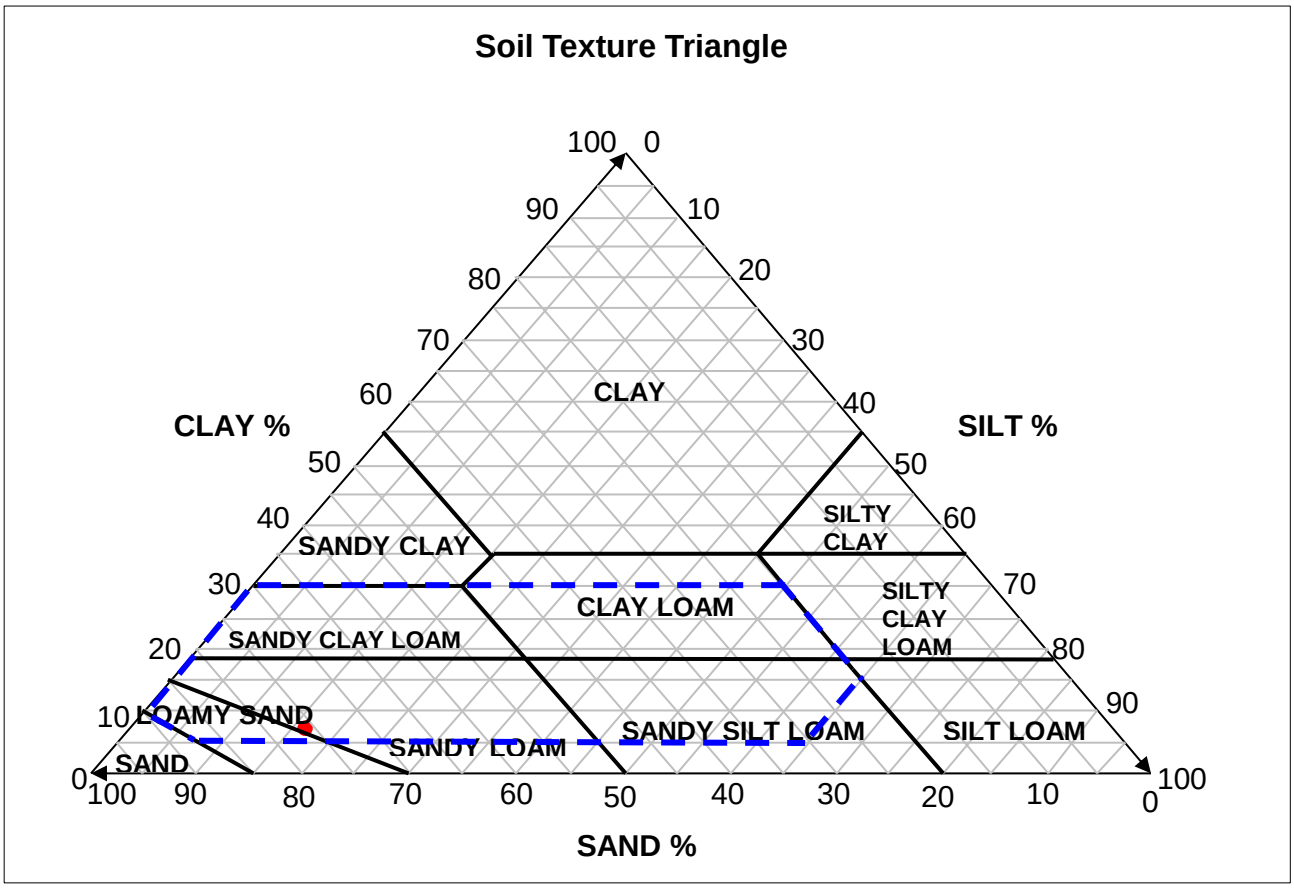
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

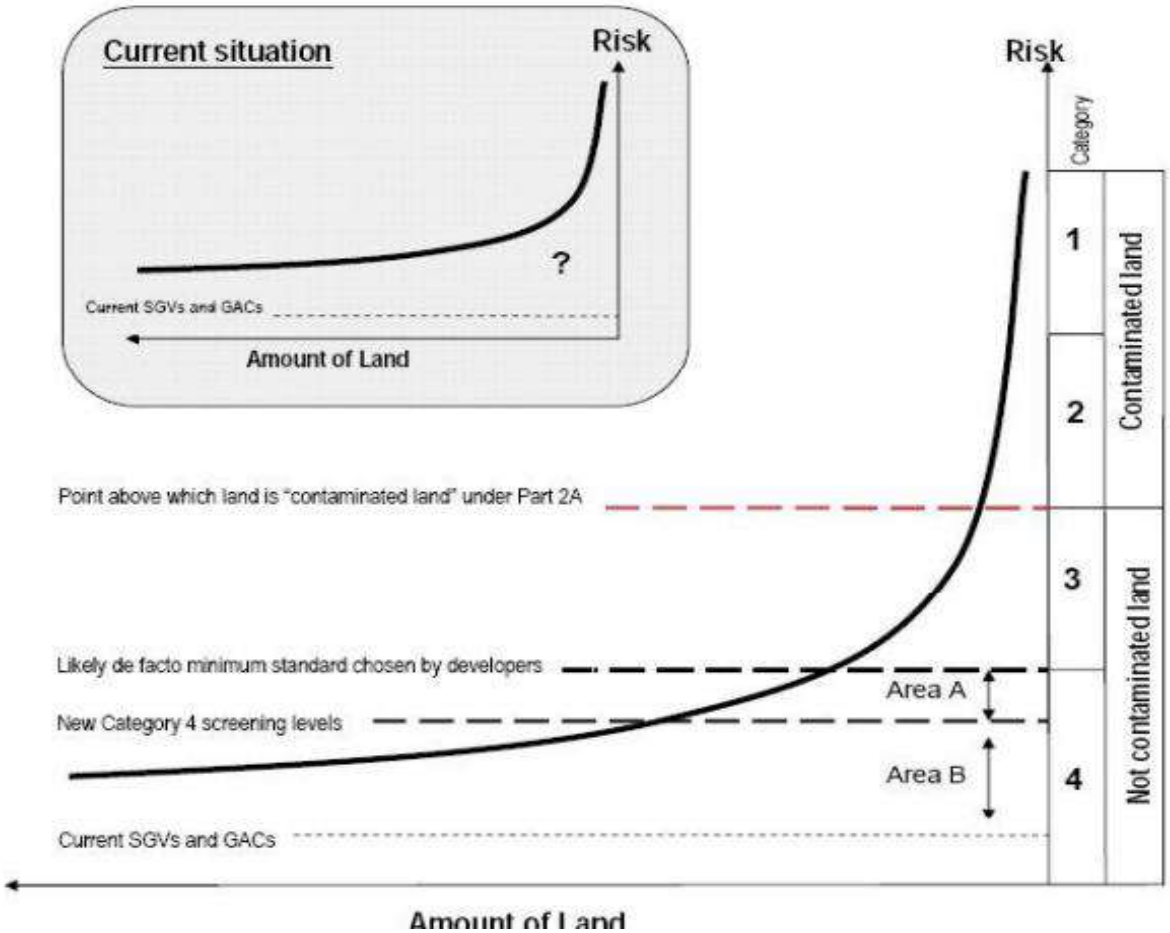
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

*Ebony Gheorghe*
*BSc MSc*
*Soil Scientist*

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**01254 377622**

# ANNEX B

## Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX C

Photographs

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park, Lancashire BB5 5TU

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Photograph 1: Validation of Garden Capping



Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Photograph 3: Validation of Garden Capping




Photograph 4: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

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Photograph 5: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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GEO-ENVIRONMENTAL CONSULTING

Our Ref: BEK/23104/241211/CG/11

11th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 11

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND*'. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 11 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

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**T** +44(0)1924 360458 **E** mdja@geoenvironmental.co.uk **W** www.geoenvironmental.co.uk
**Partners:** Anthony D Joyce BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP
Lucie A M Joyce BSc (Hons) Edward L H Joyce BSc (Hons)

MIchael D Joyce Associates LLP

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

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

# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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

**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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The results included within the report relate only to the sample(s) submitted for testing.

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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

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

# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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**i2 Analytical**
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Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

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The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

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# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

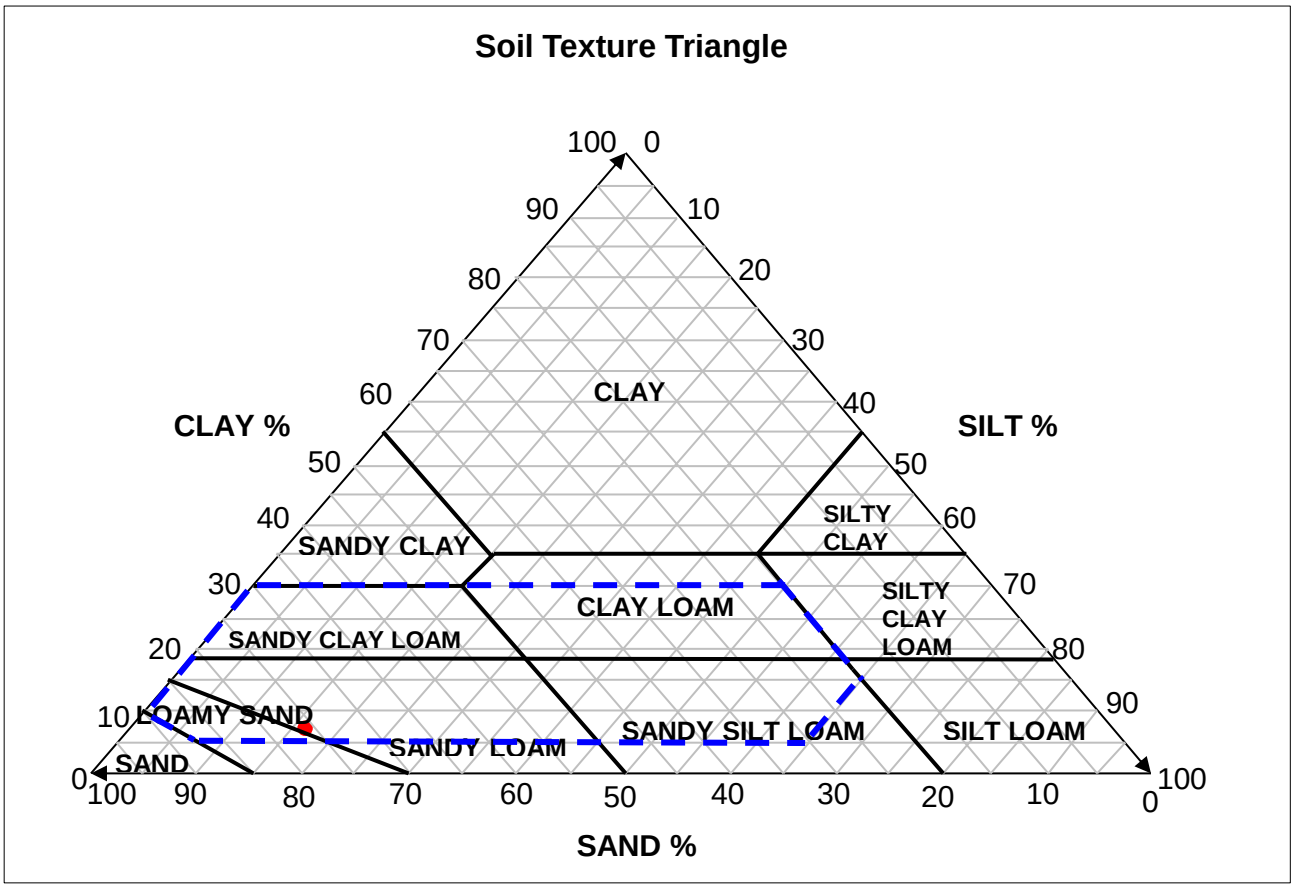
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

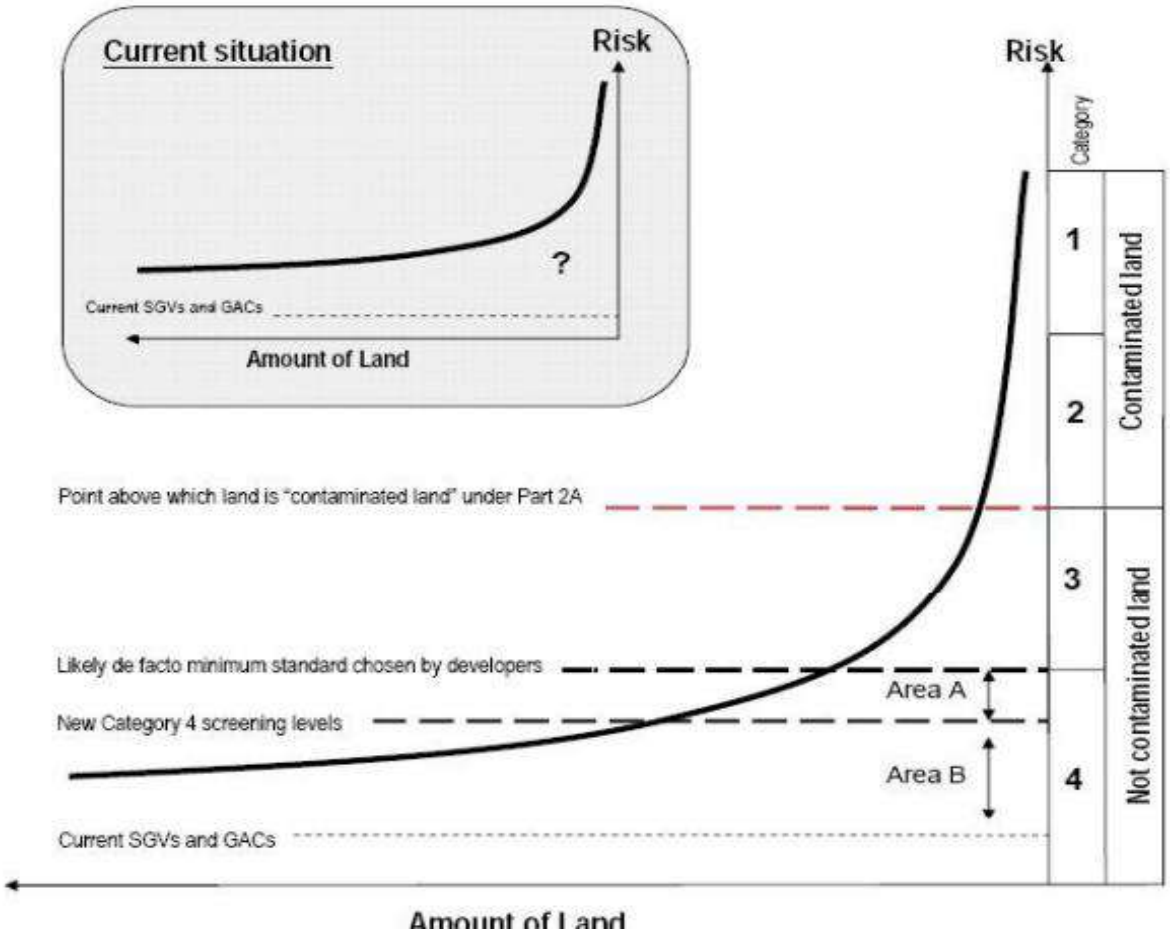
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*

C4SLs, therefore, should not be viewed as "SPOSH levels" and they should not be used as a legal trigger for the determination of land under Part 2A.

CL:AIRE (Contaminated Land: Application in Real Environments) has published "*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*". In it a series of C4SLs were proposed as follows;

| Analyte | Residential (with home grown produce) (mg/kg) | Residential (without home grown produce) (mg/kg) | Allotments (mg/kg) | Commercial (mg/kg) | POS (mg/kg) |
|---|---|---|---|---|---|
| Arsenic | 37 | 40 | 49 | 640 | 79 |
| Benzene | 0.87 | 3.3 | 0.18 | 98 | 140 |
| Benzo(a)Pyrene | 5 | 5.3 | 5.7 | 77 | 10 |
| Cadmium | 22 | 150 | 3.9 | 410 | 880 |
| Chromium (vi) | 21 | 21 | 170 | 49 | 21 |
| Lead | 200 | 310 | 80 | 2300 | 630 |

Where C4SL's are not available, Generic Assessment Criteria have been used as follows;

## Generic Assessment Criteria for Human Health Risk Assessment Comparison
## METALS/CYANIDE

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and based on 6% soil organic matter (SOM)**
**Values are expressed in mg/kg**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE or *ATRISKSOIL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential with homegrown produce | Residential without homegrown produce | Allotment | Commercial | POSresi | POSpark | Residential | Allotment | Commercial | Residential without consumption of homegrown produce | Allotment | Commercial |
| Antimony[1] | | | | | | | | | | | | | | | | 550 | ND | 7500 |
| Arsenic (6% SOM) | 37 | 40 | 43 | 640 | 79 | 170 | 37 | 40 | 49 | 640 | 79 | 170 | 32 | 43 | 640 | | | |
| Barium[1] | | | | | | | | | | | | | | | | 1300 | ND | 22000 |
| Beryllium (6% SOM) | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 | | | | | | | | | | | | |
| Boron (6% SOM) | 290 | 11000 | 45 | 240000 | 21000 | 46000 | | | | | | | | | | | | |
| Cadmium (6% SOM) | 11 | 85 | 1.9 | 190 | 120 | 560 | 22 | 150 | 3.9 | 410 | 220 | 880 | 10 | 1.8 | 230 | | | |
| Chromium (III) (6% SOM) | 910 | 910 | 18000 | 8600 | 1500 | 33000 | | | | | | | | | | | | |
| Chromium (VI) (6% SOM) | 6 | 6 | 1.8 | 33 | 7.7 | 220 | 21 | 21 | 170 | 49 | 21 | 250 | | | | | | |
| Copper (6% SOM) | 2400 | 7100 | 520 | 68000 | 12000 | 44000 | | | | | | | | | | | | |
| Cyanide (AtriskSoil) | | | | | | | | | | | | | | | | 34* | 34* | 34* |
| Lead (6% SOM) | | | | | | | 200 | 310 | 80 | 2300 | 630 | 1300 | | | | | | |
| Nickel (6%SOM) | 130 | 180 | 53 | 980 | 230 | 800 | | | | | | | | | | | | |
| Mercury (Elemental) (6% SOM) | 1.2 | 1.2 | 21 | 58 | 16 | 30 | | | | | | | 1.0 | 26 | 26 | | | |
| Mercury (Inorganic) (6% SOM) | 40 | 56 | 19 | 1100 | 120 | 240 | | | | | | | 170 | 80 | 3600 | | | |
| Mercury (Methyl) (6% SOM) | 11 | 15 | 6 | 320 | 40 | 68 | | | | | | | 11 | 8 | 410 | | | |
| Molybdbenum[1] | | | | | | | | | | | | | | | | 670 | ND | 17000 |
| Selenium (6% SOM) | 250 | 430 | 88 | 12000 | 1100 | 1800 | | | | | | | 350 | 120 | 13000 | | | |
| Vanadium (6% SOM) | 410 | 1200 | 91 | 9000 | 2000 | 5000 | | | | | | | | | | | | |
| Zinc (6% SOM) | 3700 | 40000 | 620 | 730000 | 81000 | 170000 | | | | | | | | | | | | |

**Additional notes for EIC/AGS/CL:AIRE GAC**

1 Due to the limitations in time and scope of the EIC/AGS/CL:AIRE project, plant uptake factors were not derived for metals and therefore the metals GAC have only been produced for residential without consumption of homegrown produce and commercial land-uses. Note that the derived GAC are not dependent on SOM.

## PETROLEUM HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM).**
**SGVs based on 6% SOM, at a lower SOM the SGV may not be sufficiently protective.**
**Generic assessment criteria for Petroleum Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 10**

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Aliphatic EC 5-6 (1% SOM) | 42 | 42 | 730 | 3200 (340) | 570000 (304) | 95000 (304) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (2.5% SOM) | 78 | 78 | 1700 | 5900 (558) | 590000 | 130000 (558) | | | | | | | | | | | | | |
| Aliphatic EC 5-6 (6% SOM) | 160 | 160 | 3900 | 12000 (1150) | 600000 | 18000 (1550) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (1% SOM) | 100 | 100 | 2300 | 7800 (144) | 600000 | 150000 (144) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (2.5% SOM) | 230 | 230 | 5600 | 17000 (322) | 610000 | 220000 (322) | | | | | | | | | | | | | |
| Aliphatic EC>6-8 (6% SOM) | 530 | 530 | 13000 | 40000 (736) | 620000 | 320000 (736) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (1% SOM) | 27 | 27 | 320 | 2000 (78) | 13000 | 14000 (78) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (2.5% SOM) | 65 | 65 | 770 | 4800 (190) | 13000 | 18000 (190) | | | | | | | | | | | | | |
| Aliphatic EC>8-10 (6% SOM) | 150 | 150 | 1700 | 11000 (451) | 13000 | 21000 (451) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (1% SOM) | 130 (48) | 130 (48) | 2200 | 9700 (48) | 13000 | 21000 (48) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (2.5% SOM) | 330 (118) | 330 (118) | 4400 | 23000 (118) | 13000 | 23000 (118) | | | | | | | | | | | | | |
| Aliphatic EC>10-12 (6%SOM) | 760 (283) | 770 (283) | 7300 | 47000 (283) | 13000 | 24000 (283) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (1% SOM) | 1100 (24) | 1100 (24) | 11000 | 59000 (24) | 13000 | 25000 (24) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (2.5% SOM) | 2400 (59) | 2400 (59) | 13000 | 82000 (59) | 13000 | 25000 (59) | | | | | | | | | | | | | |
| Aliphatic EC>12-16 (6% SOM) | 4300 (142) | 4300 (142) | 13000 | 90000 (142) | 13000 | 26000 (142) | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>16-35 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (1% SOM) | 65000 (8.48) | 65000 (8.48) | 260000 | 1600000 | 250000 | 450000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (2.5% SOM) | 92000 (21) | 92000 (21) | 270000 | 1700000 | 250000 | 480000 | | | | | | | | | | | | | |
| Aliphatic EC>35-44 (6% SOM) | 110000 | 110000 | 270000 | 1800000 | 250000 | 490000 | | | | | | | | | | | | | |
| Aromatic EC 5-7 (1% SOM) | 70 | 370 | 13 | 26000 (1220) | 56000 | 76000 (1220) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (2.5% SOM) | 140 | 690 | 27 | 46000 (2260) | 56000 | 84000 (2260) | | | | | | | | | | | | | |
| Aromatic EC 5-7 (6% SOM) | 300 | 1400 | 57 | 86000 (4710) | 56000 | 92000 (4710) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (1% SOM) | 130 | 860 | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (2.5% SOM) | 290 | 1800 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Aromatic EC>7-8 (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (1% SOM) | 34 | 47 | 8.6 | 3500 (613) | 5000 | 7200 (613) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (2.5% SOM) | 83 | 110 | 21 | 8100 (1500) | 5000 | 8500 (1500) | | | | | | | | | | | | | |
| Aromatic EC>8-10 (6% SOM) | 190 | 270 | 51 | 17000 (3580) | 5000 | 9300 (3580) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (1% SOM) | 74 | 250 | 13 | 16000 (364) | 5000 | 9200 (364) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (2.5% SOM) | 180 | 590 | 31 | 28000 (899) | 5000 | 9700 (899) | | | | | | | | | | | | | |
| Aromatic EC>10-12 (6% SOM) | 380 | 1200 | 74 | 34000 (2150) | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (1% SOM) | 140 | 1800 | 23 | 36000 (169) | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (2.5% SOM) | 330 | 2300 (419) | 57 | 37000 | 5100 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>12-16 (6% SOM) | 660 | 2500 | 130 | 38000 | 5000 | 10000 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (1% SOM) | 260 | 1900 | 46 | 28000 | 3800 | 7600 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (2.5% SOM) | 540 | 1900 | 110 | 28000 | 3800 | 7700 | | | | | | | | | | | | | |
| Aromatic EC>16-21 (6% SOM) | 930 | 1900 | 260 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>21-35 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (1% SOM) | 1100 | 1900 | 370 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (2.5% SOM) | 1500 | 1900 | 820 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aromatic EC>35-44 (6% SOM) | 1700 | 1900 | 1600 | 28000 | 3800 | 7900 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1600 | 1900 | 1200 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1800 | 1900 | 2100 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |
| Aliphatic + Aromatic EC>44-70 ( | 1900 | 1900 | 3000 | 28000 | 3800 | 7800 | | | | | | | | | | | | | |

| | S4UL | | | | | | C4SL | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Benzene (1% SOM) | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 | | | | | | | | | | | | | |
| Benzene (2.5% SOM) | 0.17 | 0.7 | 0.034 | 47 | 72 | 100 | | | | | | | | | | | | | |
| Benzene (6% SOM) | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 | 0.87 | 3.3 | 0.18 | 98 | 140 | 230 | 0.33 | 0.07 | 95 | | | | |
| Toluene (1% SOM) | 130 | 880 (869) | 22 | 56000 (869) | 56000 | 87000 (869) | | | | | | | | | | | | | |
| Toluene (2.5% SOM) | 290 | 1900 | 51 | 110000 (1920) | 56000 | 95000 (1920) | | | | | | | | | | | | | |
| Toluene (6% SOM) | 660 | 3900 | 120 | 180000 (4360) | 56000 | 100000 (4360) | | | | | | | 610 | 120 | $4.4x10^3$ | | | | |
| Ethyl benzene (1% SOM) | 47 | 83 | 16 | 5700 (518) | 24000 | 17000 (518) | | | | | | | | | | | | | |
| Ethyl benzene (2.5% SOM) | 110 | 190 | 39 | 13000 (1220) | 24000 | 22000 (1220) | | | | | | | | | | | | | |
| Ethyl benzene (6% SOM) | 260 | 440 | 91 | 27000 (2840) | 25000 | 27000 (2840) | | | | | | | 350 | 90 | $2.8x10^3$ | | | | |
| o-xylene (1%SOM) | 60 | 88 | 28 | 6600 (478) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| o-xylene (2.5% SOM) | 140 | 210 | 67 | 15000 (1120) | 42000 | 24000 (1120) | | | | | | | | | | | | | |
| o-xylene (6% SOM) | 330 | 480 | 160 | 33000 (2620) | 43000 | 33000 (2620) | | | | | | | 250 | 160 | $2.6x10^3$ | | | | |
| m-xylene (1% SOM) | 59 | 82 | 31 | 6200 (625) | 41000 | 17000 (625) | | | | | | | | | | | | | |
| m-xylene (2.5% SOM) | 140 | 190 | 74 | 14000 (1470) | 42000 | 24000 (1470) | | | | | | | | | | | | | |
| m-xylene (6% SOM) | 320 | 450 | 170 | 31000 (3460) | 43000 | 32000 (3469) | | | | | | | 240 | 180 | $3.5x10^3$ | | | | |
| p-xylene (1% SOM) | 56 | 79 | 29 | 5900 (576) | 41000 | 17000 (478) | | | | | | | | | | | | | |
| p-xylene (2.5% SOM) | 130 | 180 | 69 | 14000 (1350) | 42000 | 23000 (1350) | | | | | | | | | | | | | |
| p-xylene (6% SOM) | 310 | 430 | 160 | 30000 (3170) | 43000 | 31000 (3170) | | | | | | | 230 | 160 | $3.2x10^3$ | | | | |
| Methyl tert-butyl ether (1% SOM) | | | | | | | | | | | | | | | | 49 | 73 | 23 | 7900 |
| Methyl tert-butyl ether (2.5% SOM) | | | | | | | | | | | | | | | | 84 | 120 | 44 | 13000 |
| Methyl tert-butyl ether (6% SOM) | | | | | | | | | | | | | | | | 160 | 220 | 90 | 24000 |

**Additional Notes for LQM/CIEH Generic Assessment Criteria**

1 For residential land use the inhalation of vapours indoors exposure pathway is the most significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12). The ingestion of soil and indoor dust and consumption of homegrown produce exposure pathways are the most significant for the higher end fractions (aliphatics EC>16-35 and EC>35-44; aromatics EC>12-16, EC16-21, EC>21-35, EC>35-44 and EC44-70).

2 For the allotment land use the consumption of homegrown produce exposure pathway is the most significant for the aromatic and lighter end aliphatic fractions. The ingestion of soil and and indoor dust is the most significant exposure pathway for the higher end aliphatics EC>12-16, EC>16-35 and EC35-44.

3 For the commercial land use the indoor inhalation of vapour exposure pathway is a significant exposure pathway for the lighter end aliphatic and aromatic fractions (up to aliphatic EC>12-16 and aromatic EC>10-12.

4 Background exposure represents a significant proportion of the total exposure for all fractions expect aromatic fractions EC>5-7 and EC>7-8 in all land uses.

**Notes for SGVs**

1 Based on a sandy loam as defined in Environment Agency (2009b) and 6% SOM. At a lower SOM, SGVs may not be sufficient protective.
2 Generic assessment criteria will vary according to SOM for all land uses.
3 SGVs assume that free phase contamination is not present.
4 SGVs based on a sub-surface soil to indoor air correction air correction factor of 10.
5 SGV presented for Toluene Commercial based on the vapour saturation limit.
6 SGV presented for Ethylbenzene Allotment and Xylene Allotment - in applying the rules for non-soil background, the inhalation background ADE is limited to being no larger than the contribution of the inhalation soil ADE.
7 Exposure of all isomers of xylene should be considered together, because the HCV applied is based on intake of total xylene and not an individual isomer in isolation.

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## POLYAROMATIC HYDROCARBONS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria for Polycyclic Aromatic Hydrocarbons will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | C4SL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| Acenaphthene (1% SOM) | 210 | 3000 (57) | 34 | 84000 (57) | 15000 | 29000 | | | | | | |
| Acenaphthene (2.5% SOM) | 510 | 4700 (141) | 85 | 97000 (141) | 15000 | 30000 | | | | | | |
| Acenaphthene (6% SOM) | 1100 | 6000 (336) | 200 | 100000 | 15000 | 30000 | | | | | | |
| Acenaphthylene (1% SOM) | 170 | 2900 (86.1) | 28 | 83000 (86.1) | 15000 | 29000 | | | | | | |
| Acenaphthylene (2.5% SOM) | 420 | 4600 (212) | 69 | 97000 (212) | 15000 | 30000 | | | | | | |
| Acenaphthylene (6% SOM) | 920 | 6000 (506) | 160 | 100000 | 15000 | 30000 | | | | | | |
| Anthracene (1% SOM) | 2400 | 31000 (1.17) | 380 | 520000 | 74000 | 150000 | | | | | | |
| Anthracene (2.5% SOM) | 5400 | 35000 | 950 | 540000 | 74000 | 150000 | | | | | | |
| Anthracene (6% SOM) | 11000 | 37000 | 2200 | 540000 | 74000 | 150000 | | | | | | |
| Benz(a)anthracene (1% SOM) | 7.2 | 11 | 2.9 | 170 | 29 | 49 | | | | | | |
| Benz(a)anthracene (2.5% SOM) | 11 | 14 | 6.5 | 170 | 29 | 56 | | | | | | |
| Benz(a)anthracene (6% SOM) | 13 | 15 | 13 | 180 | 29 | 62 | | | | | | |
| Benzo(a)pyrene (1% SOM) | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 | | | | | | |
| Benzo(a)pyrene (2.5% SOM) | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 | | | | | | |
| Benzo(a)pyrene (6% SOM) | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 | 5.0 | 5.3 | 5.7 | 77 | 10 | 21 |
| Benzo(b)fluoranthene (1% SOM) | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 | | | | | | |
| Benzo(b)fluoranthene (2.5% SOI | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 | | | | | | |
| Benzo(b)fluoranthene (6% SOM) | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 | | | | | | |
| Benzo(ghi)perylene (1% SOM) | 320 | 360 | 290 | 3900 | 640 | 1400 | | | | | | |
| Benzo(ghi)perylene (2.5% SOM) | 340 | 360 | 470 | 4000 | 640 | 1500 | | | | | | |
| Benzo(ghi)perylene (6% SOM) | 350 | 360 | 640 | 4000 | 640 | 1600 | | | | | | |
| Benzo(k)fluoranthene (1% SOM) | 77 | 110 | 37 | 1200 | 190 | 370 | | | | | | |
| Benzo(k)fluoranthene (2.5% SOI | 93 | 110 | 75 | 1200 | 190 | 410 | | | | | | |
| Benzo(k)fluoranthene (6% SOM) | 100 | 110 | 130 | 1200 | 190 | 440 | | | | | | |
| Chrysene (1% SOM) | 15 | 30 | 4.1 | 350 | 57 | 93 | | | | | | |
| Chrysene (2.5% SOM) | 22 | 31 | 9.4 | 350 | 57 | 110 | | | | | | |
| Chrysene (6% SOM) | 27 | 32 | 19 | 350 | 57 | 120 | | | | | | |
| Dibenzo(ah)anthracene (1% SOI | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 | | | | | | |
| Dibenzo(ah)anthracene (2.5% S | 0.28 | 0.32 | 0.27 | 3.6 | 0.57 | 1.3 | | | | | | |
| Dibenzo(ah)anthracene (6% SOI | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 | | | | | | |
| Fluoranthene (1% SOM) | 280 | 1500 | 52 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (2.5% SOM) | 560 | 1600 | 130 | 23000 | 3100 | 6300 | | | | | | |
| Fluoranthene (6% SOM) | 890 | 1600 | 290 | 23000 | 3100 | 6400 | | | | | | |
| Fluorene (1% SOM) | 170 | 2800 (30.9) | 27 | 63000 (30.9) | 9900 | 20000 | | | | | | |
| Fluorene (2.5% SOM) | 400 | 3800 (76.5) | 67 | 68000 | 9900 | 20000 | | | | | | |
| Fluorene (6% SOM) | 860 | 4500 (183) | 160 | 71000 | 9900 | 20000 | | | | | | |
| Indeno(123cd)pyrene (1% SOM) | 27 | 45 | 9.5 | 500 | 82 | 150 | | | | | | |
| Indeno(123cd)pyrene (2.5% SOI | 36 | 46 | 21 | 510 | 82 | 170 | | | | | | |
| Indeno(123cd)pyrene (6% SOM) | 41 | 46 | 39 | 510 | 82 | 180 | | | | | | |
| Naphthalene (1% SOM) | 2.3 | 2.3 | 4.1 | 190 (76.4) | 4900 | 1200 (76.4) | | | | | | |
| Naphthalene (2.5% SOM) | 5.6 | 5.6 | 10 | 460 (183) | 4900 | 1900 (183) | | | | | | |
| Naphthalene (6% SOM) | 13 | 13 | 24 | 1100 (432) | 4900 | 3000 | | | | | | |
| Phenanthrene (1% SOM) | 95 | 1300 (36) | 15 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (2.5% SOM) | 220 | 1500 | 38 | 22000 | 3100 | 6200 | | | | | | |
| Phenanthrene (6% SOM) | 440 | 1500 | 90 | 22000 | 3100 | 6300 | | | | | | |
| Pyrene (1% SOM) | 620 | 3700 | 110 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (2.5% SOM) | 1200 | 3800 | 270 | 54000 | 7400 | 15000 | | | | | | |
| Pyrene (6% SOM) | 2000 | 3800 | 620 | 54000 | 7400 | 15000 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 | | | | | | |
| Coal Tar (BaP as surrogate marl | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 | | | | | | |
| Coal Tar (BaP as surrogate marl | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.9 | | | | | | |

## CHLOROALCANES AND ALKANES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| 1,1-Dichloroethane (1% SOM) | | | | | | | 2.4 | 2.5 | 9.2 | 280 |
| 1,1-Dichloroethane (2.5% SOM) | | | | | | | 3.9 | 4.1 | 17 | 450 |
| 1,1-Dichloroethane (6% SOM) | | | | | | | 7.4 | 7.7 | 35 | 850 |
| 1,2-Dichloroethane (1% SOM) | 0.0071 | 0.0092 | 0.0046 | 0.67 | 29 | 21 | | | | |
| 1,2-Dichloroethane (2.5% SOM) | 0.011 | 0.013 | 0.0083 | 0.97 | 29 | 24 | | | | |
| 1,2-Dichloroethane (6% SOM) | 0.019 | 0.023 | 0.016 | 1.7 | 29 | 28 | | | | |
| 1,1,1-Trichloroethane (1% SOM) | 8.8 | 9 | 48 | 660 | 140000 | 57000 (1425) | | | | |
| 1,1,1-Trichloroethane (2.5% SOI | 18 | 18 | 110 | 1300 | 140000 | 76000 (2915) | | | | |
| 1,1,1-Trichloroethane (6% SOM) | 39 | 40 | 240 | 3000 | 140000 | 100000 (6392) | | | | |
| 1,1,2-Trichloroethane (1% SOM) | | | | | | | 0.6 | 0.88 | 0.28 | 94 |
| 1,1,2-Trichloroethane (2.5% SOM) | | | | | | | 1.2 | 1.8 | 0.61 | 190 |
| 1,1,2-Trichloroethane (6% SOM) | | | | | | | 2.7 | 3.9 | 1.4 | 400 |
| 1,1,1,2-Tetrachloroethane (1% S | 1.2 | 1.5 | 0.79 | 110 | 1400 | 1500 | | | | |
| 1,1,1,2-Tetrachloroethane (2.5% | 2.8 | 3.5 | 1.9 | 250 | 1400 | 1800 | | | | |
| 1,1,1,2-Tetrachloroethane (6% S | 6.4 | 8.2 | 4.4 | 560 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (1%SI | 1.6 | 3.9 | 0.41 | 270 | 1400 | 1800 | | | | |
| 1,1,2,2-Tetrachloroethane (2.5% | 3.4 | 8.0 | 0.89 | 550 | 1400 | 2100 | | | | |
| 1,1,2,2-Tetrachloroethane (6%SI | 7.5 | 17 | 2.0 | 1100 | 1400 | 2300 | | | | |
| 1,1-Dichloroethene (1% SOM) | | | | | | | 0.23 | 0.23 | 2.8 | 26 |
| 1,1-Dichloroethene (2.5% SOM) | | | | | | | 0.40 | 0.41 | 5.6 | 46 |
| 1,1-Dichloroethene (6% SOM) | | | | | | | 0.82 | 0.82 | 12 | 92 |
| Tetrachloroethene (1% SOM) | 0.18 | 0.18 | 0.65 | 19 | 1400 | 810 (424) | | | | |
| Tetrachloroethene (2.5% SOM) | 0.39 | 0.40 | 1.5 | 42 | 1400 | 1100 (951) | | | | |
| Tetrachloroethene (6% SOM) | 0.9 | 0.92 | 3.6 | 95 | 1400 | 1500 | | | | |
| Tetrachloromethane (1% SOM) | 0.026 | 0.026 | 0.45 | 2.9 | 890 | 190 | | | | |
| Tetrachloromethane (2.5% SOM | 0.056 | 0.056 | 1.0 | 6.3 | 920 | 270 | | | | |
| Tetrachloromethane (6% SOM) | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 | | | | |
| Trichloroethene (1% SOM) | 0.016 | 0.017 | 0.041 | 1.2 | 120 | 70 | | | | |
| Trichloroethene (2.5% SOM) | 0.034 | 0.036 | 0.091 | 2.6 | 120 | 91 | | | | |
| Trichloroethene (6% SOM) | 0.075 | 0.080 | 0.21 | 5.7 | 120 | 120 | | | | |
| Trichloromethane (1% SOM) | 0.91 | 1.2 | 0.42 | 99 | 2500 | 2600 | | | | |
| Trichloromethane (2.5% SOM) | 1.7 | 2.1 | 0.83 | 170 | 2500 | 2800 | | | | |
| Trichloromethane (6% SOM) | 3.4 | 4.3 | 1.7 | 350 | 2500 | 3100 | | | | |
| Vinyl Chloride (1% SOM) | 0.00064 | 0.00077 | 0.00055 | 0.059 | 3.5 | 4.8 | | | | |
| Vinyl Chloride (2.5% SOM) | 0.00087 | 0.0010 | 0.0010 | 0.077 | 3.5 | 5.0 | | | | |
| Vinyl Chloride (6% SOM) | 0.0014 | 0.0015 | 0.0018 | 0.12 | 3.5 | 5.4 | | | | |
| Chloroethane (1% SOM) | | | | | | | 8.3 | 8.4 | 110 | 960 |
| Chloroethane (2.5% SOM) | | | | | | | 11 | 11 | 200 | 1300 |
| Chloroethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |
| 1,2-Dichloropropane (1% SOM) | | | | | | | 0.024 | 0.024 | 0.62 | 3.3 |
| 1,2-Dichloropropane (2.5% SOM) | | | | | | | 0.042 | 0.042 | 1.2 | 5.9 |
| 1,2-Dichloropropane (6% SOM) | | | | | | | 0.084 | 0.085 | 2.6 | 12 |
| 2-Chloronaphthalene (1% SOM) | | | | | | | 3.7 | 3.8 | 40 | 390 |
| 2-Chloronaphthalene (2.5% SOM) | | | | | | | 9.2 | 9.3 | 98 | 960 |
| 2-Chloronaphthalene (6% SOM) | | | | | | | 22 | 22 | 230 | 2200 |
| Bromodichloromethane (1% SOM) | | | | | | | 0.016 | 0.019 | 0.016 | 2.1 |
| Bromodichloromethane (2.5% SOM) | | | | | | | 0.030 | 0.034 | 0.032 | 3.7 |
| Bromodichloromethane (6% SOM) | | | | | | | 0.061 | 0.07 | 0.068 | 7.6 |
| Chloromethane (1% SOM) | | | | | | | 0.0083 | 0.0085 | 0.066 | 1 |
| Chloromethane (2.5% SOM) | | | | | | | 0.0098 | 0.0099 | 0.13 | 1.2 |
| Chloromethane (6% SOM) | | | | | | | 18 | 18 | 380 | 2100 |

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| *cis* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.19 | 0.20 | 0.50 | 24 |
| *cis* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.37 | 0.39 | 1.0 | 47 |
| *trans* -1,2 Dichloroethene (1% SOM) | | | | | | | 0.19 | 0.19 | 0.93 | 22 |
| *trans* -1,2 Dichloroethene (2.5% SOM) | | | | | | | 0.34 | 0.35 | 1.9 | 40 |
| *trans* -1,2 Dichloroethene (6% SOM) | | | | | | | 0.70 | 0.71 | 4.0 | 81 |
| Dichloromethane (1% SOM) | | | | | | | 0.58 | 2.1 | 0.1 | 270 |
| Dichloromethane (2.5% SOM) | | | | | | | 0.98 | 2.8 | 0.19 | 360 |
| Dichloromethane (6% SOM) | | | | | | | 1.7 | 4.5 | 0.34 | 560 |
| Hexachloroethane (1% SOM) | | | | | | | 0.2 | 0.22 | 0.27 | 22 |
| Hexachloroethane (2.5% SOM) | | | | | | | 0.48 | 0.54 | 0.67 | 53 |
| Hexachloroethane (6% SOM) | | | | | | | 1.1 | 1.3 | 1.6 | 120 |

**Notes for EIC/AGS/CL:AIRE Generic Assessment Criteria**

1 GAC have been derived for 4 generic land uses; residential with consumption of homegrown produce, residential without consumption of homegrown produce, allotments and commercial land-use.

## EXPLOSIVES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | |
|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** |
| RDX (1% SOM) | 120 | 13000 | 17 | 210000 | 210000 | 210000 |
| RDX (2.5% SOM) | 250 | 13000 | 38 | 210000 | 26000 | 49000 (18.7) |
| RDX (6% SOM) | 540 | 13000 | 85.0 | 210000 | 27000 | 53000 |
| HMX (1% SOM) | 5.7 | 6700 | 0.86 | 110000 | 13000 | 23000 (0.35) |
| HMX (2.5% SOM) | 13 | 6700 | 1.9 | 110000 | 13000 | 23000 (0.39) |
| HMX (6% SOM) | 26 | 6700 | 3.9 | 110000 | 13000 | 24000 (0.48) |

## PESTICIDES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| Compound | S4UL Residential with home grown produce | Residential without home grown produce | Allotment | Commercial | POSresi | POSpark |
|---|---|---|---|---|---|---|
| Aldrin (1% SOM) | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| Aldrin (2.5% SOM) | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| Aldrin (6% SOM) | 7.1 | 7.5 | 9.6 | 170 | 18 | 31 |
| | | | | | | |
| Dieldrin (1% SOM) | 0.97 | 7 | 0.17 | 170 | 18 | 30 |
| Dieldrin (2.5% SOM) | 2 | 7.3 | 0.41 | 170 | 18 | 30 |
| Dieldrin (6% SOM) | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | | | | | | |
| Atrazine (1% SOM) | 3.3 | 610 | 0.5 | 9300 | 1200 | 2300 |
| Atrazine (2.5% SOM) | 7.6 | 620 | 1.2 | 9400 | 1200 | 2400 |
| Atrazine (6% SOM) | 17.4 | 620 | 2.7 | 9400 | 1200 | 2400 |
| | | | | | | |
| Dichlorovos (1% SOM) | 0.032 | 6.4 | 0.0049 | 140 | 16 | 26 |
| Dichlorovos (2.5% SOM) | 0.066 | 6.5 | 0.010 | 140 | 16 | 26 |
| Dichlorovos (6% SOM) | 0.14 | 6.6 | 0.022 | 140 | 16 | 27 |
| | | | | | | |
| Alpha-Endosulfan (1% SOM) | 7.4 | 160 (0.003) | 1.2 | 5600 (0.003) | 1200 | 2400 |
| Alpha-Endosulfan (2.5% SOM) | 18 | 280 (0.007) | 2.9 | 7400 (0.007) | 1200 | 2400 |
| Alpha-Endosulfan (6% SOM) | 41 | 410 (0.016) | 6.8 | 8400 (0.016) | 1200 | 2500 |
| | | | | | | |
| Beta-Endosulfan (1% SOM) | 7 | 190 (0.00007) | 1.1 | 6300 (0.00007) | 1200 | 2400 |
| Beta-Endosulfan (2.5% SOM) | 17 | 320 (0.0002) | 2.7 | 7800 (0.0002) | 1200 | 2400 |
| Beta-Endosulfan (6% SOM) | 39 | 440 (0.0004) | 6.4 | 8700 | 1200 | 2500 |
| | | | | | | |
| Alpha-Hexachlorocyclohexanes ( | 0.23 | 6.9 | 0.035 | 170 | 24 | 47 |
| Alpha-Hexachlorocyclohexanes ( | 0.55 | 9.2 | 0.087 | 180 | 24 | 48 |
| Alpha-Hexachlorocyclohexanes ( | 1.2 | 11 | 0.21 | 180 | 24 | 48 |
| | | | | | | |
| Beta-Hexachlorocyclohexanes (1 | 0.085 | 3.7 | 0.013 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (2 | 0.2 | 3.8 | 0.032 | 65 | 8.1 | 15 |
| Beta-Hexachlorocyclohexanes (6 | 0.46 | 3.8 | 0.077 | 65 | 8.1 | 16 |
| | | | | | | |
| Gamma-Hexachlorocyclohexane | 0.06 | 2.9 | 0.0092 | 67 | 8.2 | 14 |
| Gamma-Hexachlorocyclohexane | 0.14 | 3.3 | 0.023 | 69 | 8.2 | 15 |
| Gamma-Hexachlorocyclohexane | 0.33 | 3.5 | 0.054 | 70 | 8.2 | 15 |

## CHLOROBENZENES & METHYLBENZENES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with homegrown produce** | **Residential without homegrown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Chlorobenzene (1% SOM) | 0.46 | 0.46 | 5.9 | 56 | 11000 | 1300 (675) | | | | |
| Chlorobenzene (2.5% SOM) | 1.0 | 1.0 | 14 | 130 | 13000 | 2000 (1520) | | | | |
| Chlorobenzene (6% SOM) | 2.4 | 2.4 | 32 | 290 | 14000 | 2900 | | | | |
| 1,2-Dichlorobenzene (1% SOM) | 23 | 24 | 94 | 2000 (571) | 90000 | 24000 (571) | | | | |
| 1,2-Dichlorobenzene (2.5% SOM | 55 | 57 | 230 | 4800 (1370) | 95000 | 36000 (1370) | | | | |
| 1,2-Dichlorobenzene (6% SOM) | 130 | 130 | 540 | 11000 (3240) | 98000 | 51000 (3270) | | | | |
| 1,3-Dichlorobenzene (1% SOM) | 0.40 | 0.44 | 0.25 | 30 | 300 | 390 | | | | |
| 1,3-Dichlorobenzene (2.5% SOM | 1.0 | 1.1 | 0.6 | 73 | 300 | 440 | | | | |
| 1,3-Dichlorobenzene (6% SOM) | 2.3 | 2.5 | 1.5 | 170 | 300 | 470 | | | | |
| 1,4-Dichlorobenzene (1% SOM) | 61 | 61 | 15 | 4400 (224) | 17000 | 36000 (224) | | | | |
| 1,4-Dichlorobenzene (2.5% SOM | 150 | 150 | 37 | 10000 (540) | 17000 | 36000 (540) | | | | |
| 1,4-Dichlorobenzene (6% SOM) | 350 | 350 | 88 | 25000 (1280) | 17000 | 36000 (1280) | | | | |
| 1,2,3-Trichlorobenzene (1% SOI | 1.5 | 1.5 | 4.7 | 102 | 1800 | 770 (134) | | | | |
| 1,2,3-Trichlorobenzene (2.5% S( | 3.6 | 3.7 | 12 | 250 | 1800 | 110 (330) | | | | |
| 1,2,3-Trichlorobenzene (6% SOI | 8.6 | 8.8 | 28 | 590 | 1800 | 1600 (789) | | | | |
| 1,2,4-Trichlorobenzene (1% SOI | 2.6 | 2.6 | 55 | 220 | 15000 | 1700 (318) | | | | |
| 1,2,4-Trichlorobenzene (2.5% S( | 6.4 | 6.4 | 140 | 530 | 17000 | 2600 (786) | | | | |
| 1,2,4-Trichlorobenzene (6% SOI | 15 | 15 | 320 | 1300 | 19000 | 400 (1880) | | | | |
| 1,3,5-Trichlorobenzene (1% SOI | 0.33 | 0.33 | 4.7 | 23 | 1700 | 380 (36.7) | | | | |
| 1,3,5-Trichlorobenzene (2.5% S( | 0.81 | 0.81 | 12 | 55 | 1700 | 580 (90.8) | | | | |
| 1,3,5-Trichlorobenzene (6% SOI | 1.9 | 1.9 | 28 | 130 | 1800 | 860 (217) | | | | |
| 1,2,3,4-Tetrachlorobenzene (1% | 15 | 24 | 4.4 | 1700 (122) | 830 | 1500 (122) | | | | |
| 1,2,3,4-Tetrachlorobenzene (2.5 | 36 | 56 | 11 | 3080 (304) | 830 | 1600 | | | | |
| 1,2,3,4-Tetrachlorobenzene (6% | 78 | 120 | 26 | 4400 (728) | 830 | 1600 | | | | |
| 1,2,3,5-Tetrachlorobenzene (1% | 0.66 | 0.75 | 0.38 | 49 (39.4) | 78 | 110 (39) | | | | |
| 1,2,3,5-Tetrachlorobenzene (2.5 | 1.6 | 1.9 | 0.90 | 120 (98.1) | 79 | 120 | | | | |
| 1,2,3,5-Tetrachlorobenzene (6% | 3.7 | 4.3 | 2.2 | 240 (235) | 79 | 130 | | | | |
| 1,2,4,5-Tetrachlorobenzene (1% | 0.33 | 0.73 | 0.06 | 42 (19.7) | 13 | 25 | | | | |
| 1,2,4,5-Tetrachlorobenzene (2.5 | 0.77 | 1.7 | 0.16 | 72 (49.1) | 13 | 26 | | | | |
| 1,2,4,5-Tetrachlorobenzene (6% | 1.6 | 3.5 | 0.37 | 96 | 13 | 26 | | | | |
| Pentachlorobenzene (1% SOM) | 5.8 | 19 | 1.2 | 640 (43.0) | 100 | 190 | | | | |
| Pentachlorobenzene (2.5% SOM | 12 | 30 | 3.1 | 770 (107) | 100 | 190 | | | | |
| Pentachlorobenzene (6% SOM) | 22 | 38 | 7.0 | 830 | 100 | 190 | | | | |
| Hexachlorobenzene (1% SOM) | 1.8 (0.20) | 4.1 (0.20) | 0.47 | 110 (0.20) | 16 | 30 | | | | |
| Hexachlorobenzene (2.5% SOM) | 3.3 (0.50) | 5.7 (0.50) | 1.1 | 120 | 16 | 30 | | | | |
| Hexachlorobenzene (6% SOM) | 4.9 | 6.7 (1.2) | 2.5 | 120 | 16 | 30 | | | | |
| 1,2,4-Trimethylbenzene (1% SOM) | | | | | | | 0.35 | 0.41 | 0.38 | 42 |
| 1,2,4-Trimethylbenzene (2.5% SOM) | | | | | | | 0.85 | 0.99 | 0.93 | 99 |
| 1,2,4-Trimethylbenzene (6% SOM) | | | | | | | 2 | 2.3 | 2.2 | 220 |
| Isopropyl benzene (1% SOM) | | | | | | | 11 | 12 | 32 | 1400 |
| Isopropyl benzene (2.5% SOM) | | | | | | | 27 | 28 | 79 | 3300 |
| Isopropyl benzene (6% SOM) | | | | | | | 64 | 67 | 190 | 7700 |
| Propylbenzene (1% SOM) | | | | | | | 34 | 40 | 34 | 4100 |
| Propylbenzene (2.5% SOM) | | | | | | | 82 | 97 | 83 | 9700 |
| Propylbenzene (6% SOM) | | | | | | | 190 | 230 | 200 | 21000 |
| Styrene (1% SOM) | | | | | | | 8.1 | 35 | 1.6 | 3300 |
| Styrene (2.5% SOM) | | | | | | | 19 | 78 | 3.7 | 6500 |
| Styrene (6% SOM) | | | | | | | 43 | 170 | 8.7 | 11000 |

## PHENOLS AND CHLOROPHENOLS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | LQM/CIEH | | | | | | EA SGV | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential** | **Allotment** | **Commercial** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **otm** | **Commercial** |
| Phenol (1% SOM) | 120 | 440 (460) | 23 | 440 (26000) | 440 (10000) | 440 (7600) | | | | | | | |
| Phenol (2.5% SOM) | 200 | 690 | 42 | 690 (30000) | 690 (10000) | 690 (8300) | | | | | | | |
| Phenol (6% SOM) | 380 | 1200 | 83 | 1300 (34000) | 1300 (10000) | 1300 (9300) | 420 | 280 | 3200 (38000) | | | | |
| Chlorophenol (1% SOM) | 0.87 | 94 | 0.13 | 3500 | 620 | 1100 | | | | | | | |
| Chlorophenol (2.5% SOM) | 2.0 | 150 | 0.30 | 4000 | 620 | 1100 | | | | | | | |
| Chlorophenol (6% SOM) | 4.5 | 210 | 0.70 | 4300 | 620 | 1100 | | | | | | | |
| Pentachlorophenol (1% SOM) | 0.22 | 27 (16.7) | 0.03 | 400 | 60 | 110 | | | | | | | |
| Pentachlorophenol (2.5% SOM) | 0.52 | 29 | 0.08 | 400 | 60 | 120 | | | | | | | |
| Pentachlorophenol (6% SOM) | 1.2 | 31 | 0.19 | 400 | 60 | 120 | | | | | | | |
| 2,4-Dimethylphenol (1% SOM) | | | | | | | | | | 19 | 210 | 3 | 16000 |
| 2,4-Dimethylphenol (2.5% SOM) | | | | | | | | | | 43 | 410 | 7 | 24000 |
| 2,4-Dimethylphenol (6%SOM) | | | | | | | | | | 97 | 730 | 17 | 30000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (1%SOM) | | | | | | | | | | 80 | 3700 | 12 | 160000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (2.5%SOM) | | | | | | | | | | 180 | 5400 | 27 | 180000 |
| Total Cresols (2-Methylphenol, 3-methylphenol, 4-methylphenol) (6%SOM) | | | | | | | | | | 400 | 6900 | 63 | 180000 |

## PHTHALATES

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|
| **Compound** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Bis (2-ethylhexyl) phthalate (1% | 280 | 2700 | 47 | 85000 |
| Bis (2-ethylhexyl) phthalate (2.5 | 610 | 2800 | 120 | 86000 |
| Bis (2-ethylhexyl) phthalate (6% | 1100 | 2800 | 280 | 86000 |
| Butyl benzyl phthalate (1% SOM | 1400 | 42000 | 220 | 940000 |
| Butyl benzyl phthalate (2.5% SO | 3300 | 44000 | 550 | 940000 |
| Butyl benzyl phthalate (6% SOM | 7200 | 44000 | 1300 | 950000 |
| Diethyl Phthalate (1% SOM) | 120 | 1800 | 19 | 1500000 |
| Diethyl Phthalate (2.5% SOM) | 260 | 3500 | 41 | 220000 |
| Diethyl Phthalate (6% SOM) | 570 | 6300 | 94 | 290000 |
| Di-*n*-butyl phthalate (1% SOM) | 13 | 450 | 2 | 15000 |
| Di-*n*-butyl phthalate (2.5% SOM | 31 | 450 | 5 | 15000 |
| Di-*n*-butyl phthalate (6% SOM) | 67 | 450 | 12 | 15000 |
| Di-*n*-octyl phthalate (1% SOM) | 2300 | 3400 | 940 | 89000 |
| Di-*n*-octyl phthalate (2.5% SOM | 2800 | 3400 | 2100 | 89000 |
| Di-*n*-octyl phthalate (6% SOM) | 3100 | 3400 | 3900 | 89000 |

# OTHER ORGANICS

**Based on sandy loam soil as defined in SR3 (Environment Agency, 2009) and 1%, 2.5% and 6% soil organic matter (SOM)**
**Generic assessment criteria will vary according to SOM for all land values**
**Values are expressed in mg/kg**
**GACs assume that free phase contamination is not present**
**GACs are based on sub-surface soil to indoor air correction factor of 1**

| | S4UL | | | | | | EIC/AGS/CL:AIRE | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Compound** | **Residential with home grown produce** | **Residential without home grown produce** | **Allotment** | **Commercial** | **POSresi** | **POSpark** | **Residential with consumption of homegrown produce** | **Residential without consumption of homegrown produce** | **Allotment** | **Commercial** |
| Carbon disulphide (1% SOM) | 0.14 | 0.14 | 4.8 | 11 | 11000 | 1300 | | | | |
| Carbon disulphide (2.5% SOM) | 0.29 | 0.29 | 10 | 22 | 11000 | 1900 | | | | |
| Carbon disulphide (6% SOM) | 0.62 | 0.62 | 23 | 47 | 12000 | 2700 | | | | |
| Hexachloro-1,3-butadiene (1% S | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 | | | | |
| Hexachloro-1,3-butadiene (2.5% | 0.70 | 0.78 | 0.61 | 66 | 25 | 50 | | | | |
| Hexachloro-1,3-butadiene (6% S | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 | | | | |
| Tributyl tin oxide (1% SOM) | | | | | | | 0.25 | 1.4 | 0.042 | 130 |
| Tributyl tin oxide (2.5% SOM) | | | | | | | 0.59 | 3.1 | 0.1 | 180 |
| Tributyl tin oxide (6% SOM) | | | | | | | 1.3 | 5.7 | 0.24 | 200 |
| Biphenyl (1% SOM) | | | | | | | 66 | 220 | 14 | 18000 |
| Biphenyl (2.5% SOM) | | | | | | | 160 | 500 | 35 | 33000 |
| Biphenyl (6% SOM) | | | | | | | 360 | 980 | 83 | 48000 |
| 2,4-Dinitrotoluene (1% SOM) | | | | | | | 1.5 | 170 | 0.22 | 3700 |
| 2,4-Dinitrotoluene (2.5% SOM) | | | | | | | 3.2 | 170 | 0.49 | 3700 |
| 2,4-Dinitrotoluene (6% SOM) | | | | | | | 7.2 | 170 | 1.1 | 3800 |
| 2,6-Dintrotoluene (1% SOM) | | | | | | | 0.78 | 78 | 0.12 | 1900 |
| 2,6-Dintrotoluene (2.5% SOM) | | | | | | | 1.7 | 84 | 0.27 | 1900 |
| 2,6-Dintrotoluene (6% SOM) | | | | | | | 3.9 | 87 | 0.61 | 1900 |
| Bromoform (1% SOM) | | | | | | | 2.8 | 5.2 | 0.95 | 760 |
| Bromoform (2.5% SOM) | | | | | | | 5.9 | 11 | 2.1 | 1500 |
| Bromoform (6% SOM) | | | | | | | 13 | 23 | 4.6 | 3100 |

## 6. GEOENVIRONMENTAL RISK ASSESSMENT

6.1 **Potential Hazard Sources.** Ground contamination can occur through several causes, particularly from historical use of the site and is often linked to the processes of waste disposal, underground storage, open storage, process pipework, leaks, spillages, tanks, site filling and various other reasons. The contamination can either arise from site sources or be the result of migration from other sources off site.

6.2 **Potential Migratory Pathways.** The primary pathways are considered to be laterally or vertically downward through underlying strata or upward to the ground surface. Such pathways also provide the potential for contaminants to migrate towards local watercourses and groundwater.

6.3 **Potential Targets At Risk.** Potential environmental liabilities related to current legislation associated with contaminated land with regard to existing ownership and redevelopment are summarised.

The probability of a hazard, linked with its consequences, can be used to assess risk in accordance with the tables below for use in decision making.

**Consequence of Pollution Linkage**

| | |
|---|---|
| **Severe** | Damage to human health.<br>Substantial pollution of controlled waters.<br>Significant change in ecosystem population.<br>Irreparable damage to property. |
| **Moderate** | Non-permanent damage to human health.<br>Minor pollution of controlled waters.<br>Change in ecosystem.<br>Damage to property. |
| **Mild** | Short term health effects.<br>Slight pollution of controlled waters.<br>Slight effect on ecosystem.<br>Minor repairable damage to property. |
| **Near Zero** | No noticeable effect on human health.<br>No significant pollution to controlled waters.<br>No measurable effect on ecosystem densities.<br>Non-structural cosmetic damage to property. |

**Decision Making**

| **Probability of a hazard and an associated linkage** | **Consequences of a pollution linkage (hazard-pathway-target)** | | | |
|---|---|---|---|---|
| | Severe | Moderate | Mild | Near Zero |
| High | High | High | Medium/low | Negligible |
| Medium | High | Medium | Low | Negligible |
| Low | High/medium | Medium/low | Low | Negligible |
| Unlikely | High/medium/low | Medium/low | Low | Negligible |

Final overall risk is based on an assessment of probability of a hazard and its consequences. Risk categories are shown shaded in the table above and defined below.

| **Risk** | **Description** |
|---|---|
| High | Site probably or certainly unsuitable for present use or environmental setting. Contamination probably or certainly present and likely to have an unacceptable impact on key targets. Urgent action needed. |
| Medium/ Moderate | Site may not be suitable for present use or environmental setting. Contamination may be present, and likely to have unacceptable impact on key targets. Action may be needed on the medium term. |
| Low | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. Action unlikely to be needed in present use. |
| Negligible | Site considered suitable for present use and environmental setting. Contamination may be present but unlikely to have unacceptable impacts on key targets. No action needed while site remains in present use. |

The review of the information from the exploratory investigation may be such that a decision is made that there is no need for further investigation. Alternatively, it may be necessary to carry out a further main investigation.

The Environment Agency has set out guidance as to the classification of waste arising from construction sites in its document "The Definition of Waste" dated April 2006. This document outlines how waste is to be handled

The following activities are not regarded as a waste management activity requiring licencing.

1) Construction activities carried out for the purpose of producing a suitably engineered soil e.g. lime stabilisation, vibro-replacement and piling.

2) Uncontaminated materials produced on site (including excavated soils and materials from demolition) which can be reused without further treatment. Examples include site regrading and footing excavations.

   These must be done in accordance with the Planning Permission. Demolition material must be used in accordance with the quality protocols for the production of aggregates from inert waste, subject to appropriate testing and the lack of any harmful constituents. Uses include pipe bedding, backfill and sub-base.

3) Contaminated soils can be moved on-site providing they do not require treatment or containment. There should be no risk to the environment i.e. non-leachable and in accordance with Planning Permission. Relevant activities can include site regarding and use of materials below clean cover systems, capping, buildings and hardstanding.

Where contaminated materials have to be placed in an engineered cell to prevent pollution, then this would be classed as landfilling and require PPC permits. Any material taken off site is considered to be waste. However, this is under review. If material is waste, then there is a duty of care including ensuring material is transported by a registered carrier. The destination of material leaving the site should be regularly checked and Waste Transfer Notes kept.

**Clean Cover Systems**

According to the Environment Agency's Remediation Position Statements of May 2006, the placement of a cover system using "clean" material is not treatment of waste. Consequently, no licensing/permitting position statements are applicable to this type of remediation. If the cover system uses 'waste materials' in its construction, waste management licensing exemption paragraph 9A may be applicable to its installation. If the installation of the proposed cover system does not meet the criteria for registration of this exemption, the activity may be regulated through a waste management site license.

## 7. WASTE ACCEPTANCE CRITERIA (WAC)

The main objective of the Landfill Directive is to prevent or reduce as far as possible the negative effects of landfilling waste on the environment and on human health. It is intended to reduce the disposal of waste materials to landfills and to encourage more sustainable approaches to dealing with wastes. It bans the landfill of liquids and certain solid wastes, introduces requirements for the treatment of wastes prior to landfill and provides for the classification of landfills as sites for inert, hazardous or non-hazardous waste and prohibits co-disposal.

It sets out procedures for waste acceptance at landfills and the types of waste for each class of landfill as specified by Waste Acceptance Criteria (WAC). The WAC are predominantly lists of "limit values" for certain parameters obtained from standard leaching tests of wastes going to landfills. WAC are set out in the Landfill Directive itself. Full details can be found in the Environment Agency document "Waste Classification – Guidance on the classification and Assessment of Waste " Technical Guidance WM3 - 2015

## 8. MAIN REFERENCES


| | |
|---|---|
| British Standards | BS3882: 2015 British Standard Specification for Topsoil<br>BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations<br>BS8485: 2015 British Standard Code of Practice for the design and protective measures from methane and carbon dioxide ground gases for new buildings<br>BS10175: 2011+A2:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites |
| BRE | Radon: Guidance on protective measures for new dwellings, BR211, 2015<br>Protective measures for housing on gas-contaminated land, BR414, 2015<br>Cover systems for land regeneration, 2004<br>Concrete in aggressive ground. Special Digest SD1, 3rd Edition, 2005<br>Soakaway Design (DG365) |
| CIEH | The LQM / CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition) |
| CIRIA | Assessing risks posed by hazardous ground gases to buildings, CIRIA C665<br>Asbestos in Soil and Made Ground: a guide to understanding and managing risks, CIRIAC733, 2014<br>Good Practice on the testing and verification of protection systems for buildings against hazardous ground gases. C735:2014 |
| CL:AIRE | Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010, 2013 |
| DEFRA | Contaminated Land Report CLR 11, 2002 (7-10 withdrawn)<br>R & D Publications TOX 1 – 12, 14, 16 – 25<br>R & D Publications SGV 1, 3, 4, 5, 7, 8, 9, 10, 15 and 16 (withdrawn)<br>Improvements to Contaminated Land Guidance - "Outcome of the "Way Forward", 2008<br>Exercise on Soil Guideline Values. July 2008<br>Guidance on the Legal Definition of Contaminated Land. July 2008<br>Simplification of the Contaminated Land Regime Impact Assessment No: Defra 1133 |
| DETR | Circular 02/2000. Contaminated Land, 2000<br>Guidelines for Environmental Risk Assessment and Management, 2000 |
| Environment Agency | Guidance for the Safe Development of Housing on Land Affected by Contamination, 2000<br><br>Protective measures for housing on gas-contaminated land<br>Remediation Position Statements, May 2006<br>Guidance and monitoring of landfill leachate, groundwater and surface water<br>Human health toxicological assessment of contaminants in soil (Science Report SC050021/SR2) 2008<br>Updated technical background in the CLEA model (Science Report SC0520021/SR3)<br>Waste Classification – Guidance on the classification and Assessment of Waste - Technical Guidance WM3 (2015)<br>Contaminated Land Risk Management (2021) |
| HMSO | Part 2A of the Environmental Protection Act<br>Part 2A Statutory Guidance – April 2012<br>Contaminated Land (England) Regulations 2006<br>The Contaminated Land (England) (Amendment) Regulations 2012<br>The Water Act 2003 (Commencement No. 11) Order 2012 |
| Institution of Civil Engineers | Contaminated Land: Investigation, Assessment and Remediation, 2nd Edition |
| NHBC | Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present, 2007 |


This list is not intended to be exhaustive.

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

| | |
|---|---|
| **Project** | MSHE |
| **Job:** | Topsoil Analysis - BS3882:2015 |
| **Date:** | 13/09/2024 |
| **Job Ref No:** | TOHA/24/1533/SS |

| **Sample Reference** | | | MSHE Topsoil |
|---|---|---|---|
| | | **Accreditation** | |
| Clay (<0.002mm) | % | UKAS | 21 |
| Silt (0.002-0.063mm) | % | UKAS | 32 |
| Sand (0.063-2.0mm) | % | UKAS | 47 |
| Texture Class (UK Classification) | -- | UKAS | CL |
| Stones (2-20mm) | % DW | GLP | 1 |
| Stones (20-50mm) | % DW | GLP | 0 |
| Stones (>50mm) | % DW | GLP | 0 |
| pH Value (1:2.5 water extract) | units | UKAS | 5.1 |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS | 818 |
| Electrical Conductivity (1:2 $CaSO_4$ extract) | uS/cm | UKAS | 2494 |
| Exchangeable Sodium Percentage | % | UKAS | 1.1 |
| Organic Matter (LOI) | % | UKAS | 7.5 |
| Total Nitrogen (Dumas) | % | UKAS | 0.47 |
| C : N Ratio | ratio | UKAS | 9 |
| Extractable Phosphorus | mg/l | UKAS | 29 |
| Extractable Potassium | mg/l | UKAS | 106 |
| Extractable Magnesium | mg/l | UKAS | 76 |
| Total Arsenic (As) | mg/kg | MCERTS | 14 |
| Total Cadmium (Cd) | mg/kg | MCERTS | 0.5 |
| Total Chromium (Cr) | mg/kg | MCERTS | 23 |
| Total Copper (Cu) | mg/kg | MCERTS | 33 |
| Total Lead (Pb) | mg/kg | MCERTS | 170 |
| Total Mercury (Hg) | mg/kg | MCERTS | <0.3 |
| Total Nickel (Ni) | mg/kg | MCERTS | 16 |
| Total Selenium (Se) | mg/kg | MCERTS | <1.0 |
| Total Zinc (Zn) | mg/kg | MCERTS | 88 |
| Water Soluble Boron (B) | mg/kg | MCERTS | 0.8 |
| Total Cyanide (CN) | mg/kg | MCERTS | <1.0 |
| Total (mono) Phenols | mg/kg | MCERTS | <1.0 |
| Napthalene | mg/kg | MCERTS | 0.08 |
| Acenaphthylene | mg/kg | MCERTS | <0.05 |
| Acenaphthene | mg/kg | MCERTS | 0.06 |
| Fluorene | mg/kg | MCERTS | <0.05 |
| Phenanthrene | mg/kg | MCERTS | 0.49 |
| Anthracene | mg/kg | MCERTS | <0.05 |
| Fluoranthene | mg/kg | MCERTS | 1.20 |
| Pyrene | mg/kg | MCERTS | 1.10 |
| Benzo(a)anthracene | mg/kg | MCERTS | 0.52 |
| Chrysene | mg/kg | MCERTS | 0.62 |
| Benzo(b)fluoranthene | mg/kg | MCERTS | 0.75 |
| Benzo(k)fluoranthene | mg/kg | MCERTS | 0.40 |
| Benzo(a)pyrene | mg/kg | MCERTS | 0.71 |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS | 0.33 |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS | <0.05 |
| Benzo(g,h,i)perylene | mg/kg | MCERTS | 0.34 |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS | 6.6 |
| Aliphatic TPH>C5 - C6 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH> C6 - C8 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C8 - C10 | mg/kg | MCERTS | <0.010 |
| Aliphatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aliphatic TPH>C12 - C16 | mg/kg | MCERTS | <2.0 |
| Aliphatic TPH>C16 - C21 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH> C21-C35 | mg/kg | MCERTS | <8.0 |
| Aliphatic TPH (C5 - C35) | mg/kg | MCERTS | <10 |
| Aromatic TPH>C5 - C7 | mg/kg | MCERTS | <0.010 |
| Aromatic TPH>C7 - C8 | mg/kg | MCERTS | 0 |
| Aromatic TPH>C8 - C10 | mg/kg | MCERTS | <0.020 |
| Aromatic TPH>C10 - C12 | mg/kg | MCERTS | <1.0 |
| Aromatic TPH>C12 - C16 | mg/kg | MCERTS | 4.4 |
| Aromatic TPH>C16 - C21 | mg/kg | MCERTS | <10 |
| Aromatic TPH>C21 - C35 | mg/kg | MCERTS | 18 |
| Aromatic TPH (C5 - C35) | mg/kg | MCERTS | 23 |
| Benzene | mg/kg | MCERTS | <0.005 |
| Toluene | mg/kg | MCERTS | 0 |
| Ethylbenzene | mg/kg | MCERTS | <0.005 |
| p & m-xylene | mg/kg | MCERTS | <0.005 |
| o-xylene | mg/kg | MCERTS | <0.005 |
| MTB (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS | <0.005 |
| Asbestos Screen | ND/D | ISO 17025 | Not-detected |

CL = CLAY LOAM

**Visual Examination**

The sample was described as greyish brown (Munsell Colour 10YR 3/2), slightly moist, non-plastic, non-calcareous CLAY LOAM with a well developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone-free. No unusual odours or deleterious materials were observed.

*Ebony Gheorghe*
*BSc MSc*
*Soil Scientist*

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# ANNEX B

## Chemical Test Results

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11722
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8486-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**

Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 19.3 | 14.3 | 28.8 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D^{M\#}$ | 7.91 | 7.82 | 8.03 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D^{M\#}$ | 0.12 | 0.09 | 0.11 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D^{M\#}$ | 440 | 500 | 440 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D^{M\#}$ | 1.1 | 1.3 | 0.9 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D^{M\#}$ | 2 | 3 | 1 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D^{M\#}$ | 10 | 9 | 9 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D^{M\#}$ | 15 | 16 | 14 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D^{M\#}$ | 12 | 14 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D^{M\#}$ | 19 | 21 | 17 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D^{M\#}$ | 23 | 26 | 21 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.06 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | <0.04 | 0.07 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | <0.05 | 0.08 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | <0.05 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.08 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | <0.08 | 0.25 | <0.08 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | 0.02 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | <0.03 | 0.21 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | <0.07 | 0.21 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | <0.08 | 1.07 | <0.08 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11722**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | SS-7 | SS-8 | SS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | 3 | <1 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 6 | 12 | 7 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 12 | 13 | 10 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 3 | 2 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 18 | 16 | 13 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11722

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11722/1 | 24/11722/2 | 24/11722/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | SS-7 | SS-8 | SS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

# FINAL ANALYTICAL TEST REPORT

**Envirolab Job Number:** 24/11721
**Issue Number:** 1 **Date:** 09 December, 2024

**Client:**
BEK Enviro Ltd
2 Landwick Court
Metcalfe Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

**Project Manager:** ** USE THIS Mick Buckley/James Mashiter
**Project Name:** Benmore Road, Blackley
**Project Ref:** N/A
**Order No:** 8485-23104-MLM
**Date Samples Received:** 02/12/24
**Date Instructions Received:** 03/12/24
**Date Analysis Completed:** 09/12/24

**Approved by:**



Andrew Bell
Client Service Manager

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| % Stones >10mm$_A$ | 10.6 | 8.8 | 5.0 | | | | | % w/w | 0.1 | A-T-044 |
| pH$_D$$^{M\#}$ | 7.85 | 7.52 | 7.67 | | | | | pH | 0.01 | A-T-031s |
| Sulphate (water sol 2:1)$_D$$^{M\#}$ | 0.04 | 0.05 | 0.05 | | | | | g/l | 0.01 | A-T-026s |
| Sulphate (acid soluble)$_D$$^{M\#}$ | 430 | 420 | 530 | | | | | mg/kg | 200 | A-T-028s |
| Cyanide (total)$_A$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-042sTCN |
| Phenols - Total by HPLC$_A$ | <0.2 | <0.2 | <0.2 | | | | | mg/kg | 0.2 | A-T-050s |
| Organic Matter$_D$$^{M\#}$ | 2.5 | 3.1 | 3.0 | | | | | % w/w | 0.1 | A-T-032s |
| Arsenic$_D$$^{M\#}$ | 4 | 4 | 7 | | | | | mg/kg | 1 | A-T-024s |
| Boron (water soluble)$_D$$^{M\#}$ | <1.0 | <1.0 | <1.0 | | | | | mg/kg | 1 | A-T-027s |
| Cadmium$_D$$^{M\#}$ | <0.5 | <0.5 | <0.5 | | | | | mg/kg | 0.5 | A-T-024s |
| Copper$_D$$^{M\#}$ | 9 | 9 | 10 | | | | | mg/kg | 1 | A-T-024s |
| Chromium$_D$$^{M\#}$ | 13 | 13 | 13 | | | | | mg/kg | 1 | A-T-024s |
| Chromium (hexavalent)$_D$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-040s |
| Lead$_D$$^{M\#}$ | 49 | 48 | 53 | | | | | mg/kg | 1 | A-T-024s |
| Mercury$_D$ | <0.17 | <0.17 | <0.17 | | | | | mg/kg | 0.17 | A-T-024s |
| Nickel$_D$$^{M\#}$ | 10 | 10 | 11 | | | | | mg/kg | 1 | A-T-024s |
| Selenium$_D$$^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-024s |
| Zinc$_D$$^{M\#}$ | 32 | 34 | 34 | | | | | mg/kg | 5 | A-T-024s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| **Asbestos in Soil (inc. matrix)** | | | | | | | | | | |
| Asbestos in soil$_{D}^{\#}$ | NAD | NAD | NAD | | | | | | | A-T-045 |
| Asbestos Matrix (visual)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos Matrix (microscope)$_{D}$ | - | - | - | | | | | | | A-T-045 |
| Asbestos ACM - Suitable for Water Absorption Test?$_{D}$ | N/A | N/A | N/A | | | | | | | A-T-045 |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| PAH-16MS | | | | | | | | | | |
| Acenaphthene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Acenaphthylene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Anthracene$_A^{M\#}$ | <0.02 | 0.02 | <0.02 | | | | | mg/kg | 0.02 | A-T-019s |
| Benzo(a)anthracene$_A^{M\#}$ | <0.04 | 0.09 | 0.05 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(a)pyrene$_A^{M\#}$ | 0.06 | 0.13 | 0.07 | | | | | mg/kg | 0.04 | A-T-019s |
| Benzo(b)fluoranthene$_A^{M\#}$ | 0.07 | 0.14 | 0.08 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(ghi)perylene$_A^{M\#}$ | <0.05 | 0.07 | <0.05 | | | | | mg/kg | 0.05 | A-T-019s |
| Benzo(k)fluoranthene$_A^{M\#}$ | <0.07 | <0.07 | <0.07 | | | | | mg/kg | 0.07 | A-T-019s |
| Chrysene$_A^{M\#}$ | <0.06 | 0.11 | <0.06 | | | | | mg/kg | 0.06 | A-T-019s |
| Dibenzo(ah)anthracene$_A^{M\#}$ | <0.04 | <0.04 | <0.04 | | | | | mg/kg | 0.04 | A-T-019s |
| Fluoranthene$_A^{M\#}$ | 0.12 | 0.24 | 0.14 | | | | | mg/kg | 0.08 | A-T-019s |
| Fluorene$_A^{M\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-019s |
| Indeno(123-cd)pyrene$_A^{M\#}$ | 0.04 | 0.08 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Naphthalene $_A^{M\#}$ | <0.03 | <0.03 | <0.03 | | | | | mg/kg | 0.03 | A-T-019s |
| Phenanthrene$_A^{M\#}$ | 0.04 | 0.10 | 0.05 | | | | | mg/kg | 0.03 | A-T-019s |
| Pyrene$_A^{M\#}$ | 0.11 | 0.21 | 0.13 | | | | | mg/kg | 0.07 | A-T-019s |
| Total PAH-16MS$_A^{M\#}$ | 0.44 | 1.19 | 0.57 | | | | | mg/kg | 0.01 | A-T-019s |

**Envirolab Job Number: 24/11721**

**Client Project Name: Benmore Road, Blackley**

**Client Project Ref: N/A**

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 | | | | | Units | Limit of Detection | Method ref |
|---|---|---|---|---|---|---|---|---|---|---|
| Client Sample No | | | | | | | | | | |
| Client Sample ID | TS-7 | TS-8 | TS-9 | | | | | | | |
| Depth to Top | | | | | | | | | | |
| Depth To Bottom | | | | | | | | | | |
| Date Sampled | 29-Nov-24 | 29-Nov-24 | 29-Nov-24 | | | | | | | |
| Sample Type | SOIL | SOIL | SOIL | | | | | | | |
| Sample Matrix Code | 6AE | 6AE | 6AE | | | | | | | |
| TPH CWG with Clean Up | | | | | | | | | | |
| Ali >C5-C6$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C6-C8$_A$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Ali >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C10-C12$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C12-C16$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C16-C21$_A^{M\#}$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Ali >C21-C35$_A^{M\#}$ | 11 | 9 | 12 | | | | | mg/kg | 1 | A-T-055s |
| Total Aliphatics$_A$ | 11 | 9 | 12 | | | | | mg/kg | 1 | Calc-As Recd |
| Aro >C5-C7$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C7-C8$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| Aro >C8-C10$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C10-C12$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C12-C16$_A$ | <1 | <1 | <1 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C16-C21$_A^{M\#}$ | 2 | 2 | 2 | | | | | mg/kg | 1 | A-T-055s |
| Aro >C21-C35$_A^{M\#}$ | 4 | 3 | 4 | | | | | mg/kg | 1 | A-T-055s |
| Total Aromatics$_A$ | 6 | 6 | 6 | | | | | mg/kg | 1 | Calc-As Recd |
| TPH (Ali & Aro >C5-C35)$_A$ | 17 | 14 | 18 | | | | | mg/kg | 1 | Calc-As Recd |
| BTEX - Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Toluene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - Ethyl Benzene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - m & p Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| BTEX - o Xylene$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |
| MTBE$_A^{\#}$ | <0.01 | <0.01 | <0.01 | | | | | mg/kg | 0.01 | A-T-022s |

## Report Notes

**General**

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

**Key**

| | |
|---|---|
| Superscript "#" | Accredited to ISO 17025 |
| Superscript "M" | Accredited to MCertS |
| Superscript "U" | Individual result not accredited |
| None of the above symbols | Analysis unaccredited |
| Subscript "A" | Analysis performed on as-received Sample |
| Subscript "D" | Analysis performed on the dried sample, crushed to pass 2mm sieve. |
| Subscript "D" on Asbestos | Analysis performed on a dried aliquot of sample provided. |
| Subscript "^" | Analysis has dependant options against results. Details appear in the comments of your Sample receipt |
| IS | Insufficient Sample for analysis |
| US | Unsuitable Sample for analysis |
| NDP | No Determination Possible |
| NAD | No Asbestos Detected |
| Trace | Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh. |
| N/A | Not applicable |

**Asbestos**

**Identification:** Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.
**Quantification:** Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres). "TRACE" will be reported as a quantification result.
**PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.**

**Assigned Matrix Codes**

| | | | | | |
|---|---|---|---|---|---|
| 1 | SAND | 6 | CLAY/LOAM | A | Contains Stones |
| 2 | LOAM | 7 | OTHER | B | Contains Construction Rubble |
| 3 | CLAY | 8 | Asbestos Bulk (Only Asbestos ID accredited) | C | Contains visible hydrocarbons |
| 4 | LOAM/SAND | 9 | Incinerator Ash (some Metals accredited) | D | Contains glass / metal |
| 5 | SAND/CLAY | | | E | Contains roots / twigs |
| **Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.** | | | | | |

**Soil Chemical Analysis:**
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

**TPH by method A-T-007:**
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

**EPH CWG (method A-T-055) from TPH CWG:**
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

**Electrical Conductivity of water by method A-T-037:**
Results greater than 12900µS/cm @ $25^0$C / 11550µS/cm @ $20^0$C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

# Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

**Client:** BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park, Altham, Lancashire , BB5 5GY

**Project:** Benmore Road, Blackley

**Clients Project No:** N/A

**Project No:** 24/11721

**Date Received:** 03/12/2024 (am)

**Cool Box Temperatures (°C):** 8.3

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

# Envirolab Analysis Dates

| Lab Sample ID | 24/11721/1 | 24/11721/2 | 24/11721/3 |
|---|---|---|---|
| Client Sample No | | | |
| Client Sample ID/Depth | TS-7 | TS-8 | TS-9 |
| Date Sampled | 29/11/24 | 29/11/24 | 29/11/24 |
| A-T-019s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-022s | 09/12/2024 | 09/12/2024 | 09/12/2024 |
| A-T-024s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-026s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-027s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-028s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-031s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-032s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-040s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-042sTCN | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-044 | 05/12/2024 | 05/12/2024 | 05/12/2024 |
| A-T-045 | 04/12/2024 | 04/12/2024 | 04/12/2024 |
| A-T-050s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| A-T-055s | 06/12/2024 | 06/12/2024 | 06/12/2024 |
| Calc-As Recd | 09/12/2024 | 09/12/2024 | 09/12/2024 |

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

**End of Report**

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5TU

mbuckley@bekenviro.co.uk
bekenviro.co.uk
**01254 377622**

# ANNEX C

Photographs

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park, Lancashire BB5 5TU

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bekenviro.co.uk
**01254 377622**




Photograph 1: Validation of Garden Capping



Photograph 2: Validation of Garden Capping

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
No.2 Landwick Court, Metcalf Drive, Altham Business Park,
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Photograph 3: Validation of Garden Capping




Photograph 4: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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Photograph 5: Validation of Garden Capping

**BEK Geo-Environmental Consulting**
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GEO-ENVIRONMENTAL CONSULTING

Our Ref: BEK/23104/241211/CG/12

11th December 2024

FAO James Reeveley
The Casey Group
Rydings Road
Rochdale
OL12 9PS

Dear James,

Garden Capping Validation Letter for Residential Development at Benmore Road, Blackley - PLOT 12

BEK Enviro (BEK) has been commissioned by The Casey Group (CG) to supervise and validate the post construction remediation works required at the above site.

The approved remediation works are detailed in the BEK Remediation Method Statement, Report Ref: BEK-23104-2 (Rev A), dated October 2023.

The approved remediation requirements comprise the installation of a clean cover system in private gardens as follows:

*'All private garden areas – the made ground will be removed to a maximum depth of 400 mm within each garden area. The finished garden level will be achieved by the placement of a minimum of 400 mm of clean suitable soil (250 mm subsoil and 150 mm topsoil) atop a geotextile membrane to prevent soil mixing'.*

Remediation activities have been supervised by both BEK and CG. BEK has confirmed that the soils are suitable for use (prior to placement) and carried out checks to confirm that the correct capping thickness and geotextile membrane have been achieved. BEK has relied on CG and their appointed contractors to cap the gardens with the validated capping soils.

The topsoil has been imported by CG as a product from Marchington Stone. The subsoil has been imported from the Quarry on Dean House Lane, Outlane. Source test data has been made available to BEK confirms that the imported soils are suitable for use in a residential garden. A copy of the source test data is provided within Annex A.

To ensure suitability (and to comply with testing frequency requirements), BEK inspected the imported soils placed in each of the plots and recovered representative samples for chemical testing. The topsoil is described as '*Dark brown slightly silty clayey SAND with occasional fine to coarse gravels, rare rootlet*' and the subsoil described as '*light brown very gravely slightly clayey SAND*'. Both the topsoil and subsoil are visually suitable for use. BEK has recovered a number of samples from the placed soils and copies of the chemical test results for the most recent samples tested (TS-7 to TS-9 and SS-7 to SS-9) are presented in Annex B.

GEO-ENVIRONMENTAL CONSULTING

**BEK Geo-Environmental Consulting**
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Additional samples will be recovered progressively as the remediation works continue. Regular liaison with site managers will be maintained to ensure sample frequencies are maintained progressively throughout the works. Final volumes will be provided for imported topsoil and subsoil at the end of the project.

In addition to confirming suitability of the soils used in the garden capping system at the site, BEK also confirms that that capping thickness is a minimum of 400 mm thick. CG confirm that a geotextile membrane has been placed at the base of the capping layer. Spot trial pit checks were carried out by BEK on selected plots prove the presence of the geotextile membrane and the materials used within the capping system. Photographs showing capping thickness are provided within Annex C.

Based on the information provided by CG and the validation works carried out by BEK, we can confirm that the remediation works required for Plot 12 at the residential development at Benmore Road, Blackley has been completed in accordance with the approved methodology. This certificate should be read in conjunction with the final Validation Report that will be prepared on completion of all remediation works at the site.

I trust the above is satisfactory. Should you require anything further please do not hesitate to contact the undersigned.

Yours sincerely

MICHAEL BUCKLEY
*BSc (Hons) MSc MIEnvSci CEnv*

**BEK Geo-Environmental Consulting**
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# ANNEX A

Source Test Data

Michael D Joyce Associates LLP
Geotechnical and Geoenvironmental Consultants

Your ref:

Our ref: ADJ/DJM/11444

Date: 19th November 2024

Mr. L. Robinson
Termrim Construction Limited
1 Pellon Place
Dyson Wood Way
Bradley Business Park
Huddersfield
HD2 1GT

**By Email**

Dear Lee

**Quarry on Dean House Lane, Outlane**
**Report No. 4321**

Further to your recent request, I visited the quarry on Dean House Lane in Outlane on 8th November 2024.

Edwards propose to supply subsoil which is derived from the crushing of virgin rock, just beyond the site entrance.

A sample was taken for contamination testing.

The results of the laboratory testing have been reassessed using Category 4 Screening Levels and LQM/CIEH S4UL's for Human Health Risk Assessment (2015). In the case of organic compounds, a worse-case Soil Organic Matter content (SOM) has been assumed in the first instance.

Continued....

**Table 1: Soil Concentrations**

| Analyte | Maximum Permitted Concentrations (mg/kg) | Recorded Concentration (mg/kg) |
|---|---|---|
| Arsenic (total) | 37 (1) | 3.7 |
| Cadmium (total) | 22 (1) | <0.2 |
| Chromium (VI) | 21 (1) | <1.8 |
| Copper (total) | 2400 (2) | 14 |
| Lead (total) | 200 (1) | 8.1 |
| Mercury (total) | 40 (2) | <0.3 |
| Nickel (total) | 130 (2) | 19 |
| Selenium (total) | 250 (2) | <1.0 |
| Zinc (total) | 3700 (2) | 23 |
| Phenols (total) | 420 (1) | <1.0 |
| Naphthalene | 2.3 (2) | <0.05 |
| Acenaphthylene | 170 (2) | <0.05 |
| Acenaphthene | 210 (2) | <0.05 |
| Fluorene | 170 (2) | <0.05 |
| Phenanthrene | 95 (2) | 0.10 |
| Anthracene | 2400 (2) | <0.05 |
| Fluoranthene | 280 (2) | 0.09 |
| Pyrene | 620 (2) | 0.07 |
| Benzo (a) anthracene | 7.2 (2) | <0.05 |
| Chrysene | 15 (2) | <0.05 |
| Benzo (b) fluoranthene | 2.6 (2) | <0.05 |
| Benzo (k) fluoranthene | 77 (2) | <0.05 |
| Benzo (a) pyrene | 5.0 (1) | <0.05 |
| Indeno (1,2,3 cd) pyrene | 27 (2) | <0.05 |
| Dibenz (a,h) anthracene | 0.24 (2) | <0.05 |
| Benzo (g,h,l) perylene | 320 (2) | <0.05 |
| Asbestos | None | None |

***(1)*** *C4SL published 2014.*

***(2)*** *LQM/CIEH S4UL's for Human Health Risk Assessment (2015) (1% SOM assumed).*

The results confirmed the material to be uncontaminated.

One sample was also taken and tested in accordance with BS8601: Specification for sub-soil. The results complied with the requirements of a multi-purpose subsoil.

The full results are attached.

Yours sincerely

**A D Joyce**

Enc.

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**Partners:** Anthony D Joyce BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP
Lucie A M Joyce BSc (Hons) Edward L H Joyce BSc (Hons)

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WD18 8YS

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

# Analytical Report Number : 24-053092

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 18/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 18/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| Lab Sample Number | | | | 375590 |
|---|---|---|---|---|
| Sample Reference | | | | Subsoil |
| Sample Number | | | | None Supplied |
| Depth (m) | | | | None Supplied |
| Date Sampled | | | | 08/11/2024 |
| Time Taken | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |
| Stone Content | % | 0.1 | NONE | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 11 |
| Total mass of sample received | kg | 0.1 | NONE | 1.2 |
| **Asbestos** | | | | |
| Asbestos in Soil Detected/Not Detected | Type | N/A | ISO 17025 | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | WEM |
| **General Inorganics** | | | | |
| pH (L099) | pH Units | N/A | MCERTS | 8.1 |
| Total Cyanide | mg/kg | 1 | MCERTS | < 1.0 |
| Water Soluble Sulphate as $SO_4$ 16hr extraction (2:1) | mg/kg | 2.5 | MCERTS | 56 |
| Water Soluble $SO_4$ 16hr extraction (2:1 Leachate Equivalent) | mg/l | 1.25 | MCERTS | 27.9 |
| **Total Phenols** | | | | |
| Total Phenols (monohydric) | mg/kg | 1 | MCERTS | < 1.0 |
| **Speciated PAHs** | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluorene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 0.1 |
| Anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 0.09 |
| Pyrene | mg/kg | 0.05 | MCERTS | 0.07 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Chrysene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | < 0.05 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | < 0.05 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | < 0.05 |
| **Total PAH** | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | < 0.80 |
| **Heavy Metals / Metalloids** | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 3.7 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 14 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 6.5 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 8.1 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | < 0.3 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 19 |
| Selenium (aqua regia extractable) | mg/kg | 1 | MCERTS | < 1.0 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 23 |

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number: 24-053092**
**Project / Site name: Dean House Line Outlane**

| | | | | |
|---|---|---|---|---|
| **Lab Sample Number** | | | | 375590 |
| **Sample Reference** | | | | Subsoil |
| **Sample Number** | | | | None Supplied |
| **Depth (m)** | | | | None Supplied |
| **Date Sampled** | | | | 08/11/2024 |
| **Time Taken** | | | | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Test Limit of detection** | **Test Accreditation Status** | |

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

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The results included within the report relate only to the sample(s) submitted for testing.

**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375590 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053092**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Asbestos identification in Soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques | In-house method based on HSG 248, 2021 | A001B | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Sulphate, water soluble, in soil (16hr extraction) | Sulphate, water soluble, in soil (16hr extraction) | In-house method | L038B | D | MCERTS |
| Speciated PAHs and/or Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS | In-house method based on USEPA 8270 | L064B | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry | In-house method | L080-PL | W | MCERTS |
| Monohydric phenols in soil | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| Total cyanide in soil | Determination of total cyanide by distillation followed by colorimetry | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton | L080-PL | W | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement | In-house method | L099-PL | D | MCERTS |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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The results included within the report relate only to the sample(s) submitted for testing.

MIchael D Joyce Associates LLP

**e:** mdja@geoenvironmental.co.uk

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

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

# Analytical Report Number : 24-053096

| | | | |
|---|---|---|---|
| **Project / Site name:** | Dean House Line Outlane | **Samples received on:** | 11/11/2024 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 11/11/2024 |
| **Your order number:** | | **Analysis completed by:** | 19/11/2024 |
| **Report Issue Number:** | 1 | **Report issued on:** | 19/11/2024 |
| **Samples Analysed:** | 1 soil sample | | |

**Signed:**

Charlotte Andrew
Key Account Manager
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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**i2 Analytical**
7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

# Certificate of Analysis

## BS 8601:2013 Specification For Subsoil

| **Report No:** | **24-053096** | MIchael D Joyce Associates LLP |
|---|---|---|
| **Location** | Dean House Line Outlane | |
| **Lab Reference (Sample Number)** | 375604 | |
| **Sampling Date** | 08/11/2024 | |
| **Sample ID** | Subsoil | |
| **Depth (m)** | **0.00** | |

| | | **unit** | **Result** | **Compliant with range (Y/N)** | | |
|---|---|---|---|---|---|---|
| | | | | **Multipurpose subsoil** | **Specific purpose subsoil** | |
| | | | | | **Acidic** | **Calcareous** |
| **Texture** | Clay | %w/w | 8.00 | | | |
| | Silt | %w/w | 15.00 | | | |
| | Sand | %w/w | 77.00 | | | |
| | Texture Class | | SANDY LOAM | Y | Y | Y |
| **Mass Loss on Ignition** | | % | 1.80 | Y | Y | Y |
| **Coarse fragment content** | >2mm | %w/w | 18.60 | Y | Y | Y |
| | >20mm | %w/w | 0.00 | Y | Y | Y |
| | >75mm | %w/w | 0.00 | Y | Y | Y |
| **Soil pH** | | pH | 8.00 | Y | N | Y |
| **Carbonate** | | % | 2.90 | - | - | Y |
| **Exchangable Sodium Percentage** | | % | 1.30 | Y | Y | Y |
| **Phytotoxic contaminants** | Total Zinc | mg/kg | 82.00 | Y | Y | Y |
| | Total Copper | mg/kg | 9.70 | Y | Y | Y |
| | Total Nickel | mg/kg | 26.00 | Y | Y | Y |
| **Visible contaminants** | >2mm | %w/w | 0.00 | Y | Y | Y |
| | Plastics | %w/w | 0.00 | Y | Y | Y |
| | Sharps | %w/w | 0.00 | Y | Y | Y |
| **Available plant nutrients** | Phosphorus | mg/l | 22.00 | | | |
| | Potassium | mg/l | 68.30 | | | |
| | Magnesium | mg/l | 560.00 | | | |
| **Additional analysis** | Available Sodium | mg/l | 43.00 | | | |
| | Available Calcium | mg/l | 1800.00 | | | |
| | Conductivity | µS/cm | 1500.00 | | | |
| | Conductivity CaSO4 Adj. | µS/cm | < 10 | | | |
| **Compliancy** | | | | Pass | Fail | Pass |

**Pass BS 8601**

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and i2 cannot be held responsible for any discrepencies with current legislation

*= UKAS accredited

** = MCERTS accrediited

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The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

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Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Sample Description * |
|---|---|---|---|---|
| 375604 | Subsoil | None Supplied | None Supplied | Brown sandy clay with gravel |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Coarse Fragment and Contaminant Analysis | Determination of >2mm contaminants | BS3882:2007 & BS8601:2013 & PAS 100:2005 | L019B | D | NONE |
| Density of available extract | Gravimetric determination of density of dried sample up to 2 mm | In-house method | L019B | D | NONE |
| Moisture Content | Moisture content, determined gravimetrically (up to 30°C) | In-house method | L019B | W | NONE |
| 75 mm Coarse Fraction - BS8601 Subsoil | Determination of > 75 mm fraction by gravimetry. | BS8601:2013 | L019B | D | NONE |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight | In-house method based on British Standard Methods and MCERTS requirements. | L019B | D | NONE |
| Conductivity (BS 3882/BS 8601) | Determination of the conductivity of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L031B | D | NONE |
| Conductivity CaSO4 adj - BS8601 Subsoil | Determination of Electical Conductivity on CaSO4 extract, adjusted | Method based on BS 8601:2013 | L031B | D | NONE |
| Carbonate - BS 8601 Subsoil | Determination of soil carbonate content | BS 8601:2013 | L034-PL | D | NONE |
| Extractable/Available Metals (BS 3882/BS 8601) | Determination of the extractable metals in soil, in accordance with BS 3882:2007 methodology | BS3882:2007 & BS8601:2013 | L038B | D | NONE |
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil | L038B | D | MCERTS |
| Loss on Ignition - BS8601 | Determination of Loss on Ignition as defined in BS 8601 | Method based on BS 8601:2013 | L047-PL | D | NONE |
| Phosphorus as PO4 (BS 3882/BS 8601) | Determination of the extractable phosphorus in soil, in accordance with BS 3882:2007 methodology | Method based on BS 3882:2015 & BS 8601:2013 | L048B | D | NONE |
| pH (BS 3882/BS 8601) | Determination of the pH of soil in accordance with BS 3882:2007 methodology | BS 3882:2007 & BS 8601:2013 | L099-PL | D | NONE |
| Subsoil (BS 8601:2013) | Specification for subsoil | BS 8601:2013 | PL | | NONE |
| Textural Classification Diagram (BS 8601:2013) | BS 8601:2013 | BS 8601:2013 | PL | | NONE |
| Geotechnical Testing | See attached geotechnical report | See attached geotechnical report | PL | | NONE |

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**Analytical Report Number : 24-053096**
**Project / Site name: Dean House Line Outlane**

**Water matrix abbreviations:**
**Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)**

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Subsoil Prep | | In-house method | L019B | D | NONE |

**For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).**
**For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).**
**For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.**
**Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.**
**Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.**

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

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# TEST CERTIFICATE

**SPECIFICATION FOR SUBSOIL**
In-house method based on: BS 8601: 2013

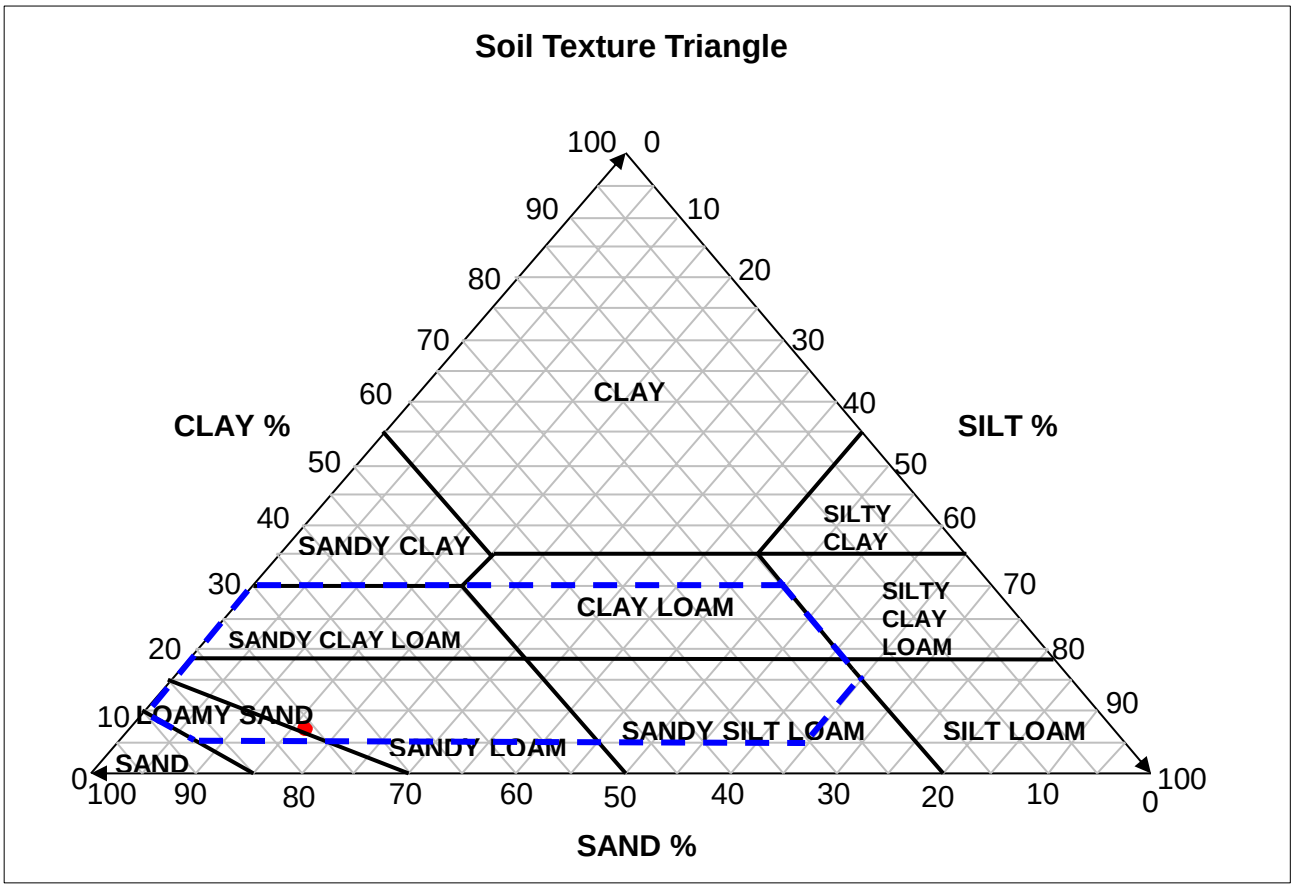
i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

| | | | |
|---|---|---|---|
| Client: | MIchael D Joyce Associates LLP | Client Reference: | Not Given |
| Client Address: | | Job Number: | 24-053096 |
| | Not Given | Date Sampled: | 08/11/2024 |
| | | Date Received: | Not Given |
| Contact: | Anthony Joyce | Date Tested: | 14/11/2024 |
| Site Address: | Dean House Line Outlane | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 375604 | Depth Top [m]: | 0.00 |
| Hole No.: | Subsoil | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | D |
| Sample Description: | SANDY LOAM | | |




| Sample Proportion | % dry mass |
|---|---|
| Sand | 76.7 |
| Silt | 15.0 |
| Clay | 8.3 |

**Texture within acceptable area (Y/N)** Y

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.

**Signed:** Katarzyna Koziel

Katarzyna Koziel
Geotechnical Reporting Team Leader
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 18/11/2024

**GF 288.11**

## STANDARD APPENDIX B

## NOTES ON CONTAMINATION INVESTIGATION PROCEDURE (June 2021)

**1.** **GENERAL.** The desk study and/or intrusive ground investigation is typically carried out in accordance with the Environment Agency's "Land Contamination Risk Management (LCRM) documents and the requirements of BS5930: 2015 and BS10175: 2011+A1: 2020. In relation to contamination the desk study is referred to as the preliminary investigation in BS10175 and the intrusive ground investigation is referred to as the Exploratory Investigation. This appendix briefly describes the nature of the work carried out and explains the standards against which contamination data has been assessed. The nature of any contamination investigation is such that only a small percentage of the ground, and therefore potential contamination, is sampled. Consequently variations in both ground conditions and contaminant levels can occur between any two sampling positions. The contamination investigation is designed to minimise such risks, but they cannot be eliminated.

**2.** **REVIEW OF CONTAMINATION ISSUES –** The National Planning Policy Framework (NPPF) and Part 2A of the Environmental Protection Act 1990 create a new regime for the identification and remediation of contaminated land. It introduced a definition of contaminated land described in Section 78A(2) of the Act of:

"any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that

(a) significant harm is being caused or there is a significant possibility of such harm being caused; or

(b) significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused:

Both Part 2A and the planning regime embrace the "suitable for use" approach. In the context of Part IIA, action is necessary only where there are unacceptable risks to health or to the environment, taking into account the current use of the land and its environmental setting.

For humans, significant harm is defined as "death, disease, serious injury ". Specifically, disease is taken to mean an unhealthy condition of the body or part of it. "Significant possibility of significant harm" is described as health effects arising from the intake of a contaminant or other direct bodily contact with the contaminant where the intake or exposure is unacceptable. The assessment should also take into account the total intake from all sources, the relative contribution of the pollutant linkage in question, and the duration of intake or exposure. The various statutory definitions are given overleaf.

The presence of unnatural substances does not automatically constitute a risk unless there is a link or pathway between the contamination (the hazard) and the receptor (the target) be it humans, the environment or property. Therefore the assessment needs to determine whether a hazard is present and whether the necessary pathway exists the so-called "pollution linkage" or "conceptual site model".

The effect of any hazard on a site depends primarily on the site use and groundwater conditions since these determine who and what may be at risk and the routes by which they may be exposed to the hazard. Site uses can include allotments, domestic gardens on residential developments, amenity and recreational areas, public open space and industrial and commercial buildings. On any site, the potential contaminants have to be identified together with the potential receptors. The pathway for that contaminant to reach its target has then to be considered.

**3.** **PRELIMINARY INVESTIGATION.** The preliminary Phase I Geoenvironmental Assessment (desk study) report normally considers the following key sections:

| | |
|---|---|
| Introduction | |
| The Site | Contaminated Land |
| Site History | Radon |
| Geology and Mining | Geoenvironmental Risk Assessment |
| Hydrogeology | Geotechnical Assessment |
| Groundsure Geo-Insight and Enviro-Insight | Ground Investigation (Recommendations) |

The report will summarise the findings and also relate our opinions to the potential for a site to be geoenvironmentally impaired, at levels likely to warrant mitigation or further consideration appropriate to the current or future use. Findings are based on information obtained and described during the desk study and site inspection without intrusive ground investigation. It is possible that further information exists. The absence of indicators of impairment does not mean that such impairment does not exist. Additional investigation including intrusive methods can reduce the risks but cannot eliminate them and may not be cost effective. We can advise on the additional research opportunities, their cost and their possible impact on mitigating risk. Recommendations are normally given based on the redevelopment proposals for the site.

| Type of Receptor | Description of harm that is to be regarded as significant harm | Conditions For There Being A Significant Possibility Of Significant Harm |
|---|---|---|
| 1. Human beings | Death, disease, serious injury, genetic mutation, birth defects or the impairment of reproductive functions.<br><br>For these purposes, disease is to be taken to mean an unhealthy condition of the body or a part of it and can include, for example, cancer, liver dysfunction or extensive skin ailments. Mental dysfunction is included only insofar as it is attributable to the effects of a pollutant on the body of the person concerned. | If the amount of the pollutant in the pollutant linkage represents an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant.<br><br>Such an assessment should take into account:<br>• the likely total intake of, or exposure to, the substance or substances which form the pollutant, from all sources including that from the pollutant linkage in question;<br>• the relative contribution of the pollutant linkage in question to the likely aggregate intake of, or exposure to, the relevant substance or substances; and<br>• the duration of intake or exposure resulting from the pollutant linkage in question.<br><br>The question of whether an intake or exposure is unacceptable is independent of the number of people who might experience or be affected by that intake or exposure.<br><br>Toxicological properties should be taken to include carcinogenic, mutagenic, teratogenic, pathogenic, endocrine-disrupting and other similar properties. |
| 2. All other human health effects (particularly by way of explosion or fire) | | If the probability, or frequency, of significant harm of that description is unacceptable. The pollutant linkage might cause "significant harm which"<br><br>• would be irreversible or incapable of being treated;<br>• would affect a substantial number of people;<br>• would result from a single incident such as a fire or an explosion; or<br>• would be likely to result from a short-term (lees than 24-hour) exposure to the pollutant. |
| 3. Any ecological system, or living organism forming part of such a system, within a location which is protected. | For any protected location:<br>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or<br>• harm which affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location. | If either:<br>• significant harm of that description is more likely than not to result from the pollutant linkage; or<br>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration. |
| 4. Property in the form of:<br>• crops, including timber;<br>• produce grown domestically, or on allotments, for consumption;<br>• livestock;<br>• other owned or domesticated animals;<br>• wild animals which are the subject of shooting or fishing rights. | For crops, a substantial diminution in yield or other substantial loss in the value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage. | If significant harm of that description is more likely than not to result from the pollutant linkage in question. |
| 5. Property in the form of buildings. | Structural failure, substantial damage or substantial interference with any right of occupation. | If significant harm of that description is more likely than not to result from the pollutant linkage in question during the expected economic life of the building. |
| 6. Controlled waters. | | |

**4.** **INTRUSIVE INVESTIGATION.** BS10175 describes this as an exploratory investigation. Intrusive ground investigation is described in Standard Appendix A. During the investigation representative or indicative samples are obtained for testing by an accredited laboratory. The aim is to determine (with a degree of confidence appropriate to the objectives), the presence, concentration and distribution of contaminants in respect of those points investigated. The extent of any necessary intrusive investigation will depend on the size of the site and any hazards, either known or suspected.

**5.** **ASSESSMENT OF CONTAMINATION.** The assessment of contaminated land under the terms of Part II A of the Environmental Protection Act 1990 is based upon pollution linkage (source - pathway - receptor model) and the principles of the Environment Agency's "Contamination Land Risk Management" documentation.

DEFRA previously issued "Outcome of the Way Forward Exercise on Soil Guideline Values". This document was intended to provide guidance to determine if there is a Significant Possibility of Significant Harm (SPOSH) i.e. whether land meets the legal trigger of being contaminated land.

In the context of Part 2A, a risk assessor using an SGV would conclude the following (DEFRA, 2008).

- At a representative average soil concentration at or below an SGV, it is very unlikely that there will be a *significant possibility of significant harm (SPOSH)*.

- At a representative average soil concentration above an SGV, there *might* be a *significant possibility of significant harm* with the significance linked to the margin of exceedance, the duration and frequency of exposure, and other site-specific factors that the enforcing authority may wish to take into account. Further investigation and/or detailed evaluation will usually be required.

It should be stressed that where there is any uncertainty as to whether or not there is a SPOSH, it was the policy of this practice to adopt a conservative approach, particularly in the adoption of clean cover systems.

In April 2012, Defra both published new Statutory Guidance which forms a major part of their contaminated land regimes under Part 2A of the Environment Protection Act 1990. The regime provides a means of dealing with contaminated land which poses a significant risk to human health or the environment where there is no alternative solution. It also works alongside planning rules and building regulations to help ensure that affected land is made suitable for use when it is redeveloped.

Since the regime was introduced in 2000 there has been considerable uncertainty over how to decide when land is, and is not contaminated land on grounds of the legal test of *significant possibility of significant harm to human health or the environment*.

To help address this, one of the main changes set out in the new Statutory Guidance, is the introduction of a new four category test to help decide when land is, and is not, contaminated land on grounds of *significant possibility of significant harm to human health*. Under the new four category test:

- Category 1 describes land that is clearly contaminated land, for example because similar land is known to have caused significant harm in the past.

- Categories 2 and 3 cover less straightforward land where more detailed consideration is needed before the regulator can decide either: (a) that there is a strong case for regulatory action, in which case the land would be in Category 2 and be classified as contaminated land under Part 2A; or (b) that such a case does not exist, in which case the land would be in Category 3 and not be classified as contaminated land under Part 2A.

- Category 4 describes land that is clearly not contaminated land, as discussed below.

One of the main purposes of including the Categories in the Statutory Guidance is to provide a legal framework against which new technical tools can be developed by the land contamination sector to describe the Categories in more detail with regard to specific substances and/or situations.

The new Category 4 test is particularly important in terms of reducing uncertainty over when land is definitely not caught by the regime.

The new Statutory Guidance makes clear what land should be placed into Category 4, for example:

(a) Land where no relevant contaminant linkage has been established.

(b) Land where there are only normal levels of contaminants in soil (as explained in Section 3 of the guidance), unless there is a particular reason to consider otherwise. In other words land with normal background concentrations in the soil.

(c) Land that has been excluded from the need for further inspection and assessment under Part 2A because contaminant levels do not exceed relevant generic assessment criteria in accordance with Section 3 of the guidance, or relevant technical tools or advice that may be developed in accordance with paragraph 3.30 of the guidance, e.g. Category 4 Screening Levels.

(d) Land where estimated levels of exposure to contaminants in soil are likely to form only a small proportion of what a receptor might be exposed to anyway through other sources of environmental exposure (e.g. in relation to average estimated national levels of exposure to substances commonly found in the environment, to which receptors are likely to be exposed to in the normal course of their lives).

The guidance clarifies how generic assessment criteria (including the currently available SGVs/GACs) should and should not be used. It states that:

*3.27 It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work may be warranted.*

*3.28 Local authorities may use GACs and other technical tools to inform certain decisions under the Part 2A regime, provided: (i) they understand how they were derived and how they can be used appropriately; (ii) they have been produced in an objective, scientifically robust and expert manner by reputable organizations; and (iii) they are only used in a manner that is in accordance with Part 2A and this Guidance.*

*3.29 GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regard to such GACs:*

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.

(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.

(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risks to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.

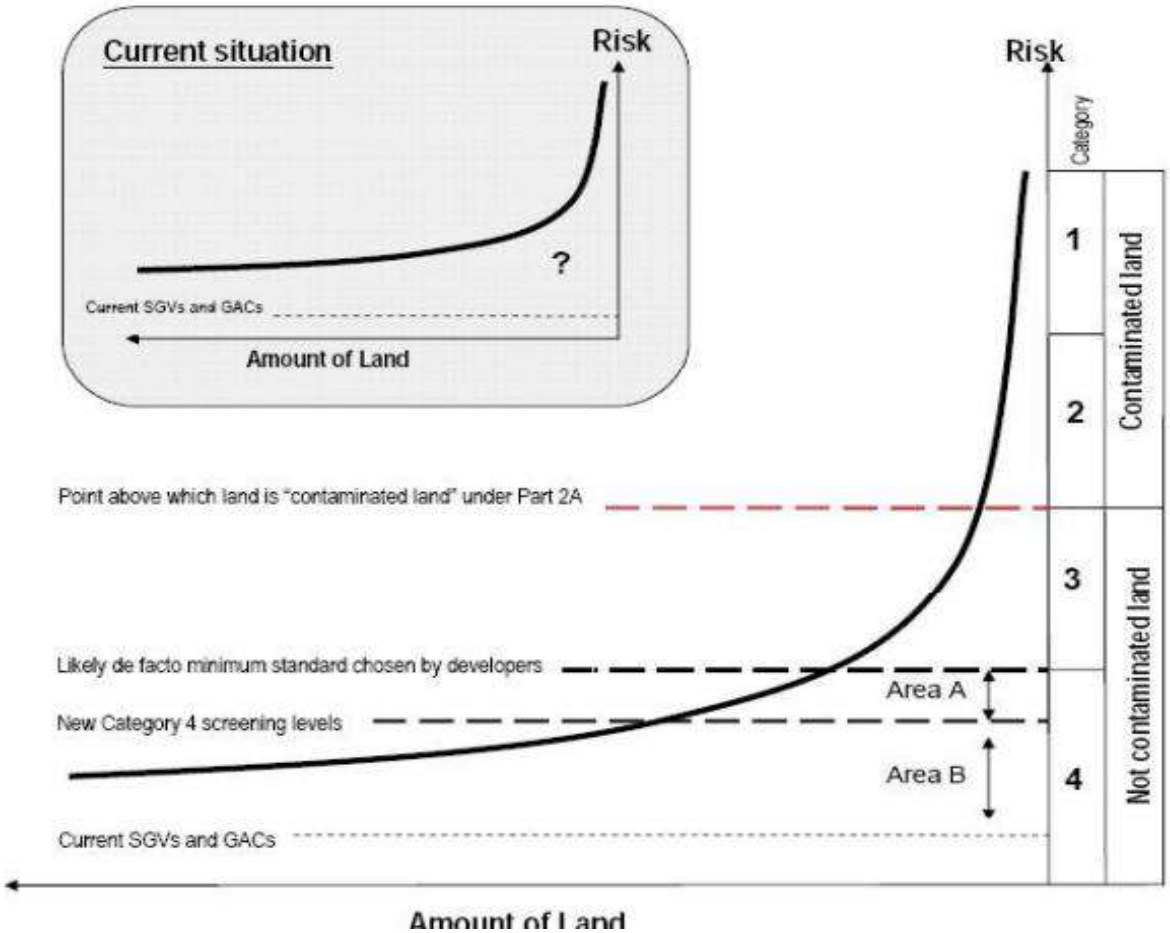
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.

(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contamination does not meet the Part 2A definition of contaminated land after it has been developed.

The way in which the new four category system is intended to operate and the place of the C4SLs within that system, was explained in detail in the Impact Assessment which accompanied the Statutory Guidance. Please note that although the detail of the Impact Assessment is included here to provide clarity on the job expected of C4SLs, the Statutory Guidance, itself, sets out the regime that needs to be delivered under Part 2A.

Paragraph 47 of the Impact Assessment describes the diagram in detail. Of particular relevance to this project is the description of the overall diagram (sub-paragraph a), description of category 4 (sub-paragraphs c (part iv) and h) and the description of how the monetised benefits of the new system will be realised (sub-paragraph h). These sub-paragraphs are reproduced below.

**Diagram showing the new Category 1-4 system (compared to current situation)**




The diagram above seeks to illustrate, in a simplified manner, broadly what the changes to the statutory guidance on significant possibility of significant harm to human health are intended to achieve. To explain:

(a) The curved line and axes illustrate the spectrum of risk presented by land contamination. The idea is to show that a very large amount of land is low risk, and only a small amount of land would pose sufficient risk to be contaminated land in the legal sense. The axes and lines in the diagrams are not to scale, and they have been compressed for the purposes of illustration (in reality the risks on Category 1 land would probably be orders of magnitude above Category 4 risks, and vastly more land would be in Category 4 compared to the other Categories).

(b) The smaller diagram summarizes the current situation. In the area below the SGV/GACs there is near certainty that land is not contaminated land, however, above the line there is increasing uncertainty. As explained above, currently remediation usually occurs to just below the SGV/GAC level because they are perceived as offering the only cast-iron guarantee of when land is definitely not contaminated land. Sometimes consultants are employed to justify remediating to levels above the SGV/GACs, however the further they go away from the SGV/GACs the more legal risk they and their clients are exposed to.

(c) The new statutory guidance will end the current situation, and it would not be legally possible e.g. for individual regulators to ignore the changes being made. For example, as explained above, the new statutory guidance will specifically say:

(i) that Part 2A cannot be used to force remediation to below a point where it ceases to be contaminated land in the legal sense i.e. the Category 2/3 border in terms of the diagram), although responsible parties can choose to go further;

(ii) that SGV/GACs cannot be used as one size fits all remediation thresholds under either Part 2A of the planning system;

(iii) that normal background levels of contamination are not caught by Part 2A; and

(iv) that SGV/GACs are well into Category 4, sometimes by only a few times and sometimes by orders of magnitude. These changes and others also provide the legal backing for the development e.g. of Category 4 screening levels, as discussed below.

(d) The new Category 1-4 system divides the spectrum of risk posed by contaminated land into four different categories, and the statutory guidance will explain how to decide when land falls into each Category. This is more sophisticated than the current statutory guidance, which in effect has only two categories (contaminated land or not) and does not explain how to decide which category land falls into. The new Category 1-4 system

reflects what assessors find when they investigate real sites i.e. some are clearly contaminated land (Category 1) ; some clearly are not (Category 4) and some are less-straightforward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3).

(e) In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions within the parameters set by the new Guidance. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. However, the regulator will have considerable flexibility for sites closer to the Category 2/3 border to judge which side of the border a site would fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken case-by-case given the many factors involved.

(f) In the case of Categories 1 and 4 the regulator will have far less flexibility. For example, if a regulator claimed that a site matching the Category 1 description was not contaminated land, or that a site matching the Category 4 description was contaminated land, they would be acting directly against the statutory guidance which the Act requires that they follow, and decisions could be challenged (e.g. in a law court) with a high chance that the challenge would be successful. Among other things, the intention of doing this is to create far more legal certainty around when land is definitely not contaminated land in the legal sense. With the specific wording of the new statutory guidance, and the supporting tools such as the new Category 4 screening levels, it would be very difficult for a regulator e.g. to threaten landowners with the Part 2A regime, and if they tried to determine land as contaminated land they would be operating in direct opposition to the statutory guidance.

(g) In the many consultation meetings held in developing the Category 1-4 system, all the developers, landowners and consultants we spoke to were strongly of the view that they would want the ensure their land is safely within Category 4 (even though in theory they could remediate to a level within Category 3 and still satisfy Part 2A and planning rules). They would do this for various reasons, including the fact that the flexibility granted to regulators in Categories 2 and 3 means that the further into Category 3 a site gets, the greater the risk that the regulator might decide it is in Category 2. Also they would want to be in Category 4 for reasons of marketability, future proofing etc. So developers and others would have a strong incentive to seek the regulatory certainty of being safely within Category 4. Thus, as far as development taking place under the planning system is concerned, Category 3 would, in effect, normally be a buffer which provides added reassurance that development falling within Category 4 will not be caught by the Part 2A regime.

(h) The new statutory guidance will bring about a situation where the current SGV/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land. Above the C4SLs, in Area A on the diagram, there will be much stronger legal backing for experts to use their judgement to make sensible and precautionary decisions on when land should be considered to be towards the top end of Category 4, without fear that land may be caught as contaminated land. This recognizes that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore have to err on the side of caution whilst a detailed site specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

(i) The very large majority of the monetized benefits of the changes to the regime discussed in this Impact Assessment manifest themselves in Category 4, and in particular in Areas A and B on the diagram. The main effects of moving to the new system would include Low risk land falling within Area B (pre-development) on the diagram would no longer have to be remediated because it would fall below the new C4SLs. Similarly land which is in Area A pre-development would no longer need to be remediated if justified by a detailed site-specific assessment. For these sites the cost of remediation would be removed altogether. The cost of remediating land which is initially in Categories 3, 2 or 1 would fall because it would be remediated to the new C4SL levels (or somewhere within Area A if there has been a detailed assessment) rather than the SGV/GAC level. This will have the overall effect of reducing the cost of remediation, with the effect varying according to specific site circumstances, the type of remediation etc. Generally the cost of remediation would fall for many affected brownfield land sites. This would have the general effect of making such land more economically viable for development. It would also mean that some land that is not currently economically viable to develop becomes reduce pressure to develop Greenfield land in some cases. The C4SLs will also speed up regulatory decisions on the reuse of brownfield land by providing a simple remediation standard.

The C4SLs are intended as "*relevant technical tools*" (in relation to Paragraph 4.2.1(c)) provides to help local authorities and others when deciding to stop further assessment of a site, on the grounds that it falls within Category 4 (Human Health).

The Impact Assessment (IA), which accompanied the revised SG (Defra, 2012b) provides further information on the nature and potential role of the C4SLs. Paragraph 47(h) of the IA states that:

> *"The new statutory guidance with bring about a situation where the current SGVs/GACs are replaced with more pragmatic (but still strongly precautionary) Category 4 screening levels (C4SLs) which will provide a higher simple test for deciding that land is suitable for use and definitely not contaminated land".*

A key distinction between the Soil Guideline Values (SGVs) and the C4SLs is the level of risk that they describe. As described by the Environment Agency (2009a):

> *"SGVs are guidelines on the level of long-term human exposure to individual chemicals in soils that, unless stated otherwise, are tolerable or pose a minimal risk to human health".*