

Soil Quality & Contamination Test

23 March 2025

Cheshire Soils and Aggregates Ltd
Daresbury, Cheshire

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1. Introduction

The following document provides details of a Soil Contamination & Quality Test carried out by Oakshire Environmental, and includes a description of the site, proposed project, sampling methodology, testing methodology and an evaluation laboratory testing.

1.1 Project Overview

Soil testing has been requested by the client, to identify the quality and contamination of sampled soil from the site and assess the suitability for re-use. Oakshire Environmental will carry out Soil Quality & Contamination Testing, including delivery and collection of a soil test kit, as described below.

1.2 Purpose of Investigation

The objectives of the Soil Quality & Contamination Testing were to:

- Identify chemical and physical properties of sampled soil.
- Assess the risk to human health and the environment.
- Determine the suitability of sampled soil for use as a growing medium.
- Classify sampled soil according to British Standard Institute specification for topsoil (BS 3882).
- Assess the requirement for further investigations or treatment.

1.3 Scope of Work

- In order to identify chemical and physical properties of sampled soil, 1 x sample will be taken by the client from soil at the site and analysed for Soil Texture, Stone Content, Loss On Ignition, pH, Carbonate, Nitrogen, Phosphorus, Potassium, Magnesium, Carbon:Nitrogen ratio, Electrical Conductivity, Exchangeable Sodium, Visual contaminants, Metals (As,Be,Cd,Cu,Pb,Hg,Ni,Se,V,Zn), Chromium (III & VI), Phenols, Polycyclic Aromatic Hydrocarbons (PAHs), BTEX & MTBE, Total Petroleum Hydrocarbons (TPHs) CWG (Aliphatic/ Aromatic), pH and Asbestos (Qualitative) in a UKAS accredited laboratory.
- Results of laboratory testing will be assessed with reference to suitable screening values, including British Standard Institute specification for topsoil (BS 3882:2015) and Generic Assessment Criteria (GAC), to determine the suitability of sampled soil for use as a growing medium and classify sampled soil according to British Standard Institute specifications.
- This information will be used to provide a clear, easy to understand and actionable summary of results, and assess the requirement for further investigations or treatment.
- Report to be carried out, by professional Environmental Consultants with BSc (Hons) in Environmental Science or above, in accordance with appropriate technical guidelines, which may include Environment Agency Land Contamination: Risk Management (LCRM) guidelines, WM3 Technical Guidance, British Standards Institute and Oakshire Environmental reporting guidelines.

1.4 Limitations

Quantum Intelligent Trading Ltd is previously and hereafter referred to as "Oakshire Environmental" or "the company". Oakshire Environmental has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant when undertaking works of this nature. This report is only valid when used in its entirety and any information or advice contained within the report should not be relied upon until considered in the context of the whole report. Oakshire Environmental disclaims any responsibility to the client, as named on the front of this report ("the client"), and others in respect of any matters outside the scope of this work. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate. This report has been prepared solely for the benefit of the client and any other party using or placing reliance upon any information contained in this report does so at their own risk. Oakshire Environmental accepts no responsibility or liability for the contents of this report being used for any purpose or project for which it was not commissioned. Oakshire Environmental accepts no liability whatsoever for any loss or damage arising from the interpretation or use of this report and in no event shall the company be liable for any punitive, exemplary or other special damages, or for any indirect, incidental or consequential damages, including with respect to the performance or non-performance of any services, whether arising under breach of contract, tort or any other legal theory, and regardless of whether the company has been advised of, knew of, or should have known of the possibility of such damages. Furthermore, Oakshire Environmental does not accept any liability for the consequences of any legislative changes or the release of subsequent guidance documentation and following delivery of the report has no obligation to advise the client or any other party of such changes or their repercussions.

This report excludes consideration of potential hazards arising from any activities at the site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities. Oakshire Environmental does not warrant or guarantee that the site is free of hazardous or potentially hazardous materials or conditions. It should be noted that this report has been produced for environmental purposes only.

Oakshire Environmental cannot be held responsible for incorrect analysis of samples. The information and conclusions provided in this report are limited to, and representative of, the samples taken and cannot be extended to apply to the whole site, in addition, Oakshire Environmental cannot guarantee the accuracy of analysis for samples not taken at the source by the company or those which deviate due to exceedance of holding time or inappropriate sampling practises. The findings and/or recommendations of this report do not take into account any conditions that may be present but have hitherto not been encountered and as such further investigation and/or a reconsideration of the findings of this report should be undertaken if such conditions are subsequently encountered or an alternative development plan or land use is subsequently proposed.

2. Site

The following section describes the site and outlines the details of proposed project.

2.1 Site Description and Location

The site is located in Daresbury, Cheshire.

2.2 Proposed Project

Soil testing has been requested by the client, to identify the quality and contamination of sampled soil from the site and assess the suitability for re-use, in addition to, classifying soil according to British Standard Institute specifications.

3. Methodology

3.1 Sampling Methodology

One sample was taken by the client, on 7th March 2025, from stockpiled topsoil at the site and placed into sample containers. Sample containers used for analysis of volatile contaminants were filled as much as possible without air spaces as volatile compounds can be lost into these spaces.

3.2 Health & Safety

When collecting potentially contaminated soil samples it must be assumed that the soil is contaminated in order to protect the health of the assessor, Personal Protective Equipment (PPE) was used during the sampling process to mitigate this risk. Sample containers were packed with biodegradable fill for protection and placed in a sealed container for transportation to the laboratory.

3.3 Testing Methodology

UKAS accredited laboratory testing included a comprehensive suite of contaminants, including Soil Texture, Stone Content, Loss On Ignition, pH, Carbonate, Nitrogen, Phosphorus, Potassium, Magnesium, Carbon:Nitrogen ratio, Electrical Conductivity, Exchangeable Sodium, Visual contaminants, Metals (As, Be, Cd, Cu, Pb, Hg, Ni, Se, V, Zn), Chromium (III & VI), Phenols, Polycyclic Aromatic Hydrocarbons (PAHs), BTEX & MTBE, Total Petroleum Hydrocarbons (TPHs) CWG (Aliphatic/Aromatic), pH and Asbestos (Qualitative).

4. Evaluation of Results

4.1 Screening Values

Results of laboratory testing of soil samples were analysed by comparing them to industry standard screening values used for risk assessments. These are specific to the proposed land use and depend on the pathways present at a particular site. Exposure pathways considered include direct soil and indoor dust ingestion, skin contact with soils and dust, inhalation of vapours in indoor airspace, ingestion of homegrown produce, permeation into and/or corrosion of water pipes and leaching of contaminants through soil. It should be noted that not all of these pathways will be relevant at the site and the most appropriate screening values available have been used to assess the results. Screening values take a conservative approach to assessing potential risk and concentrations below these values can be considered to represent 'uncontaminated conditions' which pose 'LOW' risk based on the land use.

In addition, results of laboratory testing of soil samples were analysed by comparing them to threshold values set out in the British Standard for Topsoil (BS3882:2015 - Specification for Topsoil) guidance. These values provide maximum threshold limits and ideal ranges for soil parameters to determine its suitability for general purpose landscaping or specific purposes.

It is important to note that exceedance of a relevant screening value does not necessarily constitute evidence of either a 'significant possibility of significant harm' or the need for remediation. Rather such exceedance should usually trigger a further detailed quantitative risk assessment, where site-specific parameters are used to derive site-specific assessment criteria. Common sense tells us, and a robust risk evaluation reveals, that a gross exceedance is a good indicator that an unacceptable risk is present.

4.2 Summary of Results (Contamination)

- Heavy metal concentrations were low and there were no exceedances of the relevant screening values
- pH was alkaline
- Phenols and Cresols concentrations were below the laboratory limit of detection
- Total Organic Carbon was moderate, suggesting the soil has a moderate organic matter content
- Polycyclic Aromatic Hydrocarbons (PAHs) concentrations were low
- BTEX & MTBE concentrations were below the laboratory limit of detection
- Total Petroleum Hydrocarbons (TPHs) concentrations were very low
- No Asbestos was detected in sampled soil

4.3 Summary of Results (BS3882)

- Carbonate content was low and is considered to be non-calcareous
- Electrical conductivity was low and should not present issues with deficiencies in available plant nutrients
- The Carbon:Nitrogen ratio slightly exceeded the maximum threshold for multipurpose topsoil
- Sampled soil was adequately supplied with organic matter
- pH was alkaline and would be suitable for use as multipurpose topsoil
- Total Nitrogen concentration was slightly below the minimum threshold
- Concentrations of Extractable Phosphorus, Extractable Magnesium and Extractable Potassium were within an ideal range for multipurpose topsoil
- Sample soil had a sandy loam texture which should not present issues with permeability, structural degradation or compaction and is, therefore, considered to be suitable for use as multipurpose topsoil
- Stone content was low, which should not restrict the soil's suitability for use as multipurpose topsoil
- No visible contaminants, plastics or sharps were identified in sampled soil

4.4 Conclusions

Based on the results of laboratory testing, sampled soil is considered to be uncontaminated, presenting a low risk to human health and the environment, in addition, sampled soil is considered to be largely compliant with the British Standard for Multipurpose Topsoil (BS3882:2015 - Specification for topsoil, however, the nitrogen concentration was slightly low but should not significantly restrict plant growth.

It should be noted that the potential level of risk posed by a particular source is determined by assessing the potential severity of the impact of the contaminant linkage on a receptor, if it is assumed to be present, and the probability of the contaminant linkage being present.

5. References

Environment Agency *Land contamination: risk management*. [online] Available at: <gov.uk/guidance/land-contamination-how-to-manage-the-risks>.

DEFRA. *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*.

Nathanail, C.P.; McCaffrey, C.; Gillett, A.G.; Ogden, R.C. & Nathanail, J.F. *The LQM/CIEH S4ULs for Human Health Risk Assessment*.

USEPA. *Regional Screening Levels (RSLs)*. [online] Available at: <epa.gov/risk/regional-screening-levels-rsls>.

BSI (2015) *BS 3882:2015 - Specification for topsoil*.

Oakshire Environmental Available at: <oakshireenvironmental.co.uk>

Lab Number			39549
Client Reference			SOILS
Sample ID			S01
Sampling Date			07/03/2025
Test	Method	Units	
Asbestos			
Asbestos Identification	-	-	NAD
Metals			
Extractable Potassium	CE088	mg/l	359.00
Extractable Magnesium	CE088	mg/l	155.00
Extractable phosphorus	CE089	mg/l	46.00
Arsenic	CE264	mg/kg	7.30
Beryllium	CE264	mg/kg	0.50
Cadmium	CE264	mg/kg	< 1.6
Chromium	CE264	mg/kg	14.00
Copper	CE264	mg/kg	33.40
Lead	CE264	mg/kg	42.80
Mercury	CE264	mg/kg	1.50
Nickel	CE264	mg/kg	7.30
Selenium	CE264	mg/kg	< 3.0
Vanadium	CE264	mg/kg	27.50
Zinc	CE264	mg/kg	73.30
Colourimetric			
Water Soluble Chromium VI	CE263	mg/kg	< 0.040
Total Monohydric Phenols	CE078	mg/kg	< 0.50
Chromium III	CE208	mg/kg	14.00
Combustion			
Moisture Content	CE001	%	9.40
Total Carbon	CE198	%	2.70
Total nitrogen	CE198	%	0.13
Total Organic Carbon	CE197	%	2.57
Loss on Ignition	CE006	%	4.55
Miscellaneous			
% Visible Contaminatnts	CE118	%	0.00
% >2mm	CE118	%	1.70
% > 20mm	CE118	%	0.00
% >50mm	CE118	%	0.00
% Clay	CE118	%	14.80
% Sand	CE118	%	60.70
% Silt	CE118	%	24.50
% Plastics	CE118	%	0.00
% Sharps	CE118	%	0.00
Sharps	CE118	n/kg	0.00
Polyaromatic hydrocarbons			
Naphthalene	CE087	mg/kg	< 0.016
Acenaphthylene	CE087	mg/kg	< 0.015
Acenaphthene	CE087	mg/kg	0.02
Fluorene	CE087	mg/kg	0.02
Phenanthrene	CE087	mg/kg	0.29
Anthracene	CE087	mg/kg	0.07

Fluoranthene	CE087	mg/kg	0.40
Pyrene	CE087	mg/kg	0.38
Benzo(a)anthracene	CE087	mg/kg	0.20
Chrysene	CE087	mg/kg	0.20
Benzo(b)fluoranthene	CE087	mg/kg	0.22
Benzo(k)fluoranthene	CE087	mg/kg	0.08
Benzo(a)pyrene	CE087	mg/kg	0.21
Indeno(1,2,3-cd)pyrene	CE087	mg/kg	0.15
Dibenzo(a,h)anthracene	CE087	mg/kg	0.03
Benzo(g,h,i)perylene	CE087	mg/kg	0.13
Total PAH(16)	CE087	mg/kg	2.39
BTEX			
Benzene	CE267	mg/kg	< 0.001
Toluene	CE267	mg/kg	< 0.001
Ethylbenzene	CE267	mg/kg	< 0.001
MTBE	CE267	mg/kg	< 0.002
Total BTEX	CE267	mg/kg	< 0.007
m,p-Xylene	CE267	mg/kg	< 0.002
oXylenes	CE267	mg/kg	< 0.002
Total Petroleum Hydrocarbons			
>C5-C6 Aliphatic (HS_1D_AL)	CE267	mg/kg	< 0.10
>C6-C8 Aliphatic (HS_1D_AL)	CE267	mg/kg	< 0.10
>C8-C10 Aliphatic (HS_1D_AL)	CE267	mg/kg	< 0.10
>C10-C12 Aliphatic (EH_2D_AL)	CE250	mg/kg	< 1.0
>C12-C16 Aliphatic (EH_2D_AL)	CE250	mg/kg	< 0.5
>C16-C21 Aliphatic (EH_2D_AL)	CE250	mg/kg	< 0.7
>C21-C35 Aliphatic (EH_2D_AL)	CE250	mg/kg	< 4.0
>C35-C40 Aliphatic (EH_2D_AL)	CE250	mg/kg	< 0.5
>C6-C7 Aromatic (HS_1D_AR)	CE267	mg/kg	< 0.010
>C7-C8 Aromatic (HS_1D_AR)	CE267	mg/kg	< 0.010
>C8-C10 Aromatic (HS_1D_AR)	CE267	mg/kg	< 0.010
>C10-C12 Aromatic (EH_2D_AR)	CE250	mg/kg	1.90
>C12-C16 Aromatic (EH_2D_AR)	CE250	mg/kg	3.60
>C16-C21 Aromatic (EH_2D_AR)	CE250	mg/kg	2.40
>C21-C35 Aromatic (EH_2D_AR)	CE250	mg/kg	12.40
>C35-C40 Aromatic (EH_2D_AR)	CE250	mg/kg	1.70
Wet Chem			
Carbon Nitrogen Ratio	CE197/198	ratio	20.43
Electrical Conductivity	CE007	µS/cm	101.00
pH	CE004	pH units	7.60
SVOC			
Phenol	CE189	mg/kg	< 0.10
Cresols	CE189	mg/kg	< 0.10
Xylenols	CE189	mg/kg	< 0.10
Naphthols	CE189	mg/kg	< 0.10
Trimethylphenols	CE189	mg/kg	< 0.10

METHOD	TESTNAME	METHOD SUMMARY	ANALYSIS BASIS
CE267	VPH in Soil	HS-GCFID	As submitted sample
SUBCON	Asbestos Solid	HSG248	Air Dried Sample
CE007	Electrical conductivity of Solids	Potentiometric	As submitted sample
CE001	WAC in leachates 10:1 single stage	BS12457-2	As submitted sample
CE083	Acid Neutralisation Capacity	Titration	Air dried sample
CE088	Extractable Cations - BS3882	Ammonium Nitrate Extraction and ICPOES	Air dried sample
CE089	Extractable Phosphorus - BS3882	Sodium Hydrogen Carbonate extraction and ICPOES	Air dried sample
CE002	WAC moistures	Gravimetric	As submitted sample
CE062	Acid Soluble Sulphate in Solids	Primacs	Air dried sample
CE137	PCB's in Soil	DCM Extraction and GCMS	As submitted sample
CE189	SVOC in solids	DCM Extraction and GCMS	As submitted sample
CE264	Metals by ICP in Soil	ICPOES	Air dried sample
CE192	BTEX in solids	Analysis by HSGCFID	As submitted sample
CE261	Anions by Discrete Analyser in Solids	Gallery	Air dried sample
CE258	Ammonia by Discrete Analyser in Leachate	Gallery	As submitted sample
CE263	ChromiumVI by Discrete Analyser in Solid	Gallery	Air dried sample
CE250	GCXGC in Solids	DCM Extraction and GCxGC-FID	As submitted sample
CE087	PAH in Soil	DCM Extraction and GCMS	As submitted sample
CE034	Elemental Sulphur	HPLC UV	Air dried sample
CE078	Phenols in Solids	Continuous Flow Analyser	As submitted sample
CE208	Chromium Hexavalent in Soil	Colorimetry	Air dried sample
CE167	Sulphide in Solids	Distillation and titration	Air dried sample
CE197	Primacs in Solids	Primacs	Air dried sample
CE006	Loss on ignition at 440 deg C	Gravimetric	Air dried sample
CE162	Mineral Oil in Solids	Acetone:Hexane extract, Floriil clean up and GCFID	As submitted sample

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination. Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed. The results relate only to the sample received. PCB congener results may include any coeluting PCBs Uncertainty of measurement for the determinands tested are available upon request Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
-	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

