Quantum Intelligent Trading Ltd
Company No: 06537088
VAT No: 369 2662 60
Tel: 0800 433 2906
oakshireenvironmental.co.uk

Soil Contamination Test

24 June 2024

Fleetwood Town Council
Fleetwood Marsh Nature Reserve, Jameson Road, Fleetwood, FY7 8TW

Report by Mr Louis Turner BSc (Hons)
Supervised by Mr Joseph Turner

CONTENTS

1. Introduction

The following document provides details of a Soil Contamination 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 contamination testing has been requested by the client, to identify and assess contamination of sampled soil from Jameson Road, Fleetwood, FY7 8TW, following potential leaching of contaminants from a nearby landfill site. Oakshire Environmental will carry out Soil Contamination Testing, as described below.

1.2 Purpose of Investigation

The objectives of the Soil Contamination Test will be to:

- Identify contamination of sampled soil from Heavy Metals and Hydrocarbons.
- Assess the risk to human health and the environment.
- Determine the requirement for further investigations or remediation.

1.3 Scope of Work

- In order to identify contamination of sampled soil, 3 x samples will be taken from soil at the site and analysed for 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 Organic Matter in a UKAS accredited laboratory.
- Results of laboratory testing will be assessed with reference to screening values, including LQM/CIEH Suitable 4 Use Levels (S4ULs), CL:AIRE Category 4 Screening Levels (C4SLs) and Generic Assessment Criteria (GAC), to assess the risk to human health and the environment.
- This information will be used to provide a clear, easy to understand and actionable summary of results, and determine the requirement for further investigations or remediation.
- 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 at the east of Fleetwood Marsh Nature Reserve, Jameson Road, Fleetwood, FY7 8TW and comprises a strip of grassland directly adjacent to an earth and stone covered bank, with the River Wyre and associated inlets bordering the ‘site’ to the east.

National Grid Reference: SD 33878 46129

2.2 Proposed Project

Soil contamination testing has been requested by the client to identify and assess contamination of sampled soil, following potential leaching of contaminants from a neighbouring landfill site and the identification of potential contamination at the site.

3. Methodology

3.1 Sampling Methodology

Three shallow trial pits were dug at the location shown on plans in the appendix, with ground conditions noted during the sampling process to inform recommendations and conclusions.

Soil samples were collected and placed into sealed sample containers. Samples collected for VOC analysis were filled as much as possible to minimise air spaces, as volatile compounds can be lost into these spaces. Soil washing was utilised between sample locations to minimise cross contamination.

Shallow soil at the site was sampled as this will represent the soil that is most likely to have been impacted by potentially contaminated surface effluent discharge or leaching.

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 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 Organic Matter.

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.

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

- Heavy metal concentrations were low in all samples
- pH was alkaline in all samples
- Phenols concentrations were below the laboratory limit of detection in all samples
- Total Organic Carbon values were low in all samples
    - Soils with low organic matter content will allow hydrocarbons to leach through the soil more easily as these organic contaminants would usually adsorb to organic matter particles
- Polycyclic Aromatic Hydrocarbons (PAHs) concentrations were below the laboratory limit of detection in all samples
    - PAHs are often present in made ground deposits and coal related products such as coal tar used for the construction of roads and are also the by-products of exhaust emissions from vehicles and can, therefore, build up to high concentrations near roads
- BTEX & MTBE concentrations were below the laboratory limit of detection in all samples
- Total Petroleum Hydrocarbons (TPHs) concentrations were below the laboratory limit of detection in samples S01 and S02 and were very low in sample S03
    - These substances are used in various oil and fuel products such as petrol, diesel and lubricant oils, in addition, these contaminants often impact soils near industrial sites where fuel and oils are stored such as garages and farms

4.3 Conclusions

Based on the results of laboratory testing, sampled soil is considered to be uncontaminated, suggesting a low risk to human health and the environment.

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

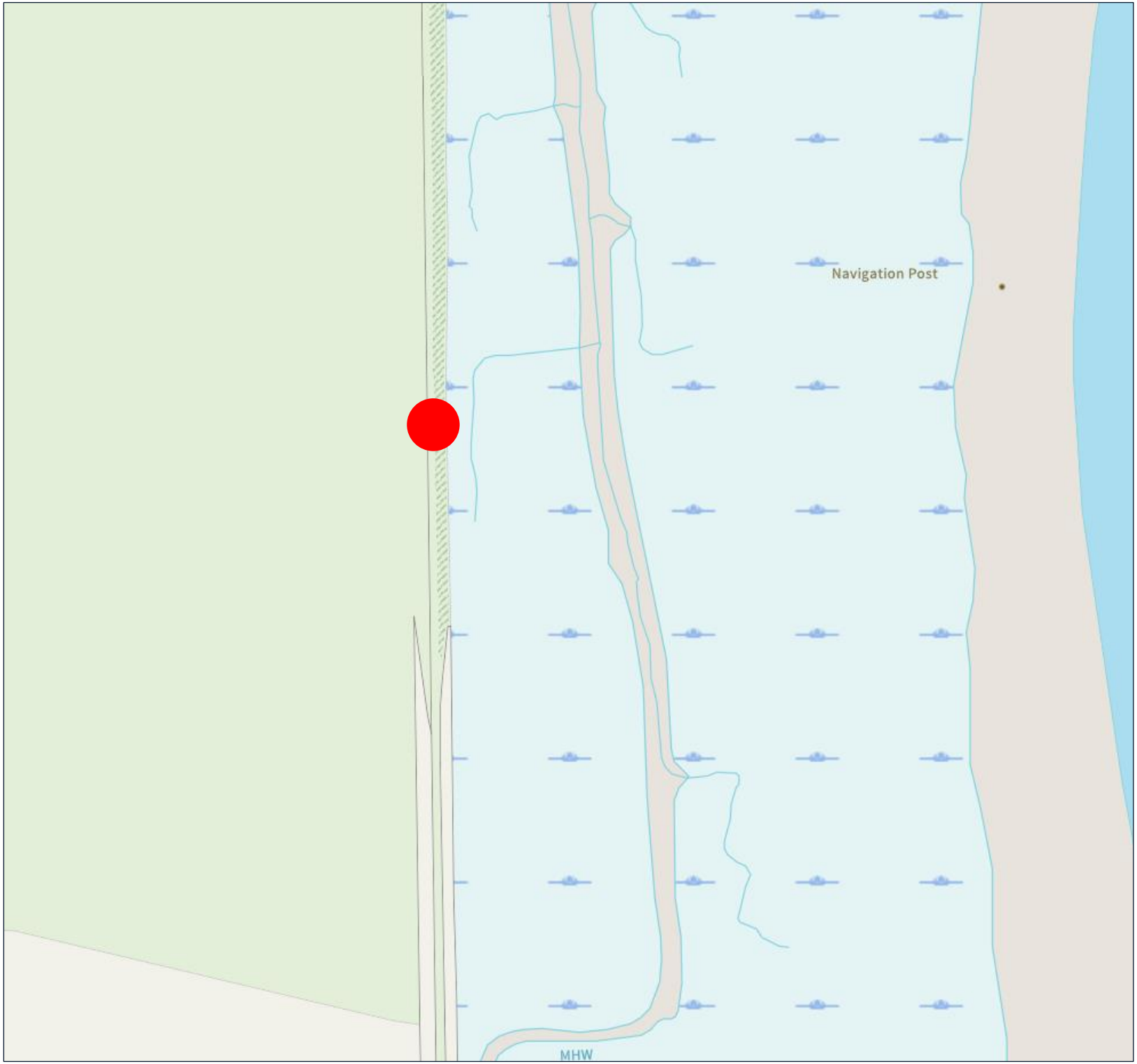
Environment Agency *Land contamination: risk management*. [online] Available at: <gov.uk/guidance/land-contamination-how-to-manage-the-risks>.

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>.

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



Appendix - Site Maps & Plans	
Description	
Site location plan	
Sources	
Contains OS data © Crown copyright and database rights	
Key	
	Site
▲	North

Appendix - Site Maps & Plans	
Description	
Site plan showing the sample locations	
Sources	
Contains OS data © Crown copyright and database rights	
Key	
⊕	Sample location
▲	North

Appendix - Site Photos
Description
Photo showing the location of sample S01
Sources
Oakshire Environmental

Appendix - Site Photos
Description
Photo showing the location of sample S02
Sources
Oakshire Environmental

Appendix - Site Photos
Description
Photo showing a discharge point at the site, adjacent to sample S02
Sources
Oakshire Environmental

Appendix - Site Photos
Description
Photo showing the location of sample S03
Sources
Oakshire Environmental

				Sample Type	SOIL	SOIL	SOIL
				Sample Location	JR S01	JR S02	JR S03
				Sample Depth (m)	0.10	0.10	0.10
				Sampling Date	10/06/2024	10/06/2024	10/06/2024
Determinand	**Codes**	**Units**	**LOD**				
Soil sample preparation parameters							
Moisture Content	N	%	0.1		31.2	30.2	30.9
Material removed	N	%	0.1		< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0		None	None	None
Metals							
Arsenic	M	mg/kg	0.5		10.6	8.6	15.6
Beryllium	M	mg/kg	0.5		0.6	0.5	0.7
Cadmium	M	mg/kg	0.2		< 0.2	< 0.2	< 0.2
Chromium	M	mg/kg	1		28.2	22.9	34.7
Chromium (III)	N	mg/kg	5		28.2	22.9	34.7
Copper	M	mg/kg	4		17.9	15.5	25.0
Lead	M	mg/kg	1		47.5	39.8	62.8
Mercury	M	mg/kg	0.1		0.4	0.2	0.5
Nickel	M	mg/kg	1		21.1	24.2	24.6
Selenium	M	mg/kg	1		< 1.0	< 1.0	< 1.0
Vanadium	M	mg/kg	0.5		28.9	21.8	35.2
Zinc	M	mg/kg	4.5		115	81.3	149
Inorganics							
Hexavalent Chromium	N	mg/kg	0.8		< 0.8	< 0.8	< 0.8
Miscellaneous							
pH	M	pH units	0.1		8.0	7.9	8.0
Total Organic Carbon	N	%	0.01		2.0	1.6	2.1
Phenols							
Phenol	M	mg/kg	1		< 1	< 1	< 1
M,P-Cresol	N	mg/kg	1		< 1	< 1	< 1
O-Cresol	N	mg/kg	1		< 1	< 1	< 1
3,4-Dimethylphenol	N	mg/kg	1		< 1	< 1	< 1
2,3-Dimethylphenol	M	mg/kg	1		< 1	< 1	< 1
2,3,5-trimethylphenol	M	mg/kg	1		< 1	< 1	< 1
Total Monohydric Phenols	N	mg/kg	5		< 5	< 5	< 5
Polyaromatic hydrocarbons							
Naphthalene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Acenaphthylene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Acenaphthene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Fluorene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Phenanthrene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Anthracene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Fluoranthene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Pyrene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Benzo(a)anthracene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Chrysene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Benzo(b)fluoranthene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Indeno(1,2,3-cd)pyrene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Dibenzo(a,h)anthracene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Benzo[g,h,i]perylene	N	mg/kg	0.5		< 0.5	< 0.5	< 0.5
Total PAH(16)	N	mg/kg	2		< 2	< 2	< 2
BTEX							
Benzene	M	ug/kg	10		< 10.0	< 10.0	< 10.0
Toluene	M	ug/kg	10		< 10.0	< 10.0	< 10.0
Ethylbenzene	M	ug/kg	10		< 10.0	< 10.0	< 10.0
Xylenes	M	ug/kg	10		< 10.0	< 10.0	< 10.0
MTBE	N	ug/kg	10		< 10.0	< 10.0	< 10.0
TPH CWG							
>C5-C6 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01		< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic (HS_1D_MS_AL)	N	mg/kg	0.01		< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1		< 1.0	< 1.0	1.2
>C10-C12 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1		< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1		< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1		< 1.0	< 1.0	< 1.0
>C21-C35 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1		< 1.0	< 1.0	3.8
>C35-C40 Aliphatic (EH_CU_1D_AL)	N	mg/kg	1		< 1.0	< 1.0	1.3
Total (>C5-C40) Aliphatic (HS_1D_MS+EH_CU_1D_AL)	N	mg/kg	1		< 1.0	< 1.0	6.3
>C5-C7 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01		< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic (HS_1D_MS_AR)	N	mg/kg	0.01		< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic (EH_CU_1D_AR)	N	mg/kg	1		< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic (EH_CU_1D_AR)	N	mg/kg	1		< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic (EH_CU_1D_AR)	N	mg/kg	1		< 1.0	< 1.0	< 1.0

>C16-C21 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C21-C35 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C35-C40 Aromatic (EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0
Total (>C5-C40) Aromatic (HS_1D_MS+EH_CU_1D_AR)	N	mg/kg	1	< 1.0	< 1.0	< 1.0
Total (>C5-C40) Ali/Aro (HS_1D_MS+EH_CU_1D_Total)	N	mg/kg	1	< 1.0	< 1.0	6.3

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	13/06/2024	110	Colorimetry
pH	M	Air dried sample	13/06/2024	113	Electromeric
Phenols in solids	M	As submitted sample	13/06/2024	121	HPLC
PAH (GC-FID)	N	As submitted sample	17/06/2024	133	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	17/06/2024	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	17/06/2024	181	GC-MS
BTEX in solids	M	As submitted sample	17/06/2024	181A	GC-MS
Total organic carbon/Total sulphur	N	Air dried sample	14/06/2024	210	IR
Aliphatic hydrocarbons in soil	N	As submitted sample	17/06/2024	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	18/06/2024	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	18/06/2024	214	GC-FID
Aqua regia extractable metals	M	Air dried sample	13/06/2024	300	ICPMS

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