

Soil Quality & Contamination Test

26 January 2024

Gunnersbury Park CIC

Gunnersbury Park, Popes Lane, London, W5 4NH

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1. Introduction

The following document provides details of a Soil Quality & 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 testing has been requested by the client, to identify and assess contamination and nutrient concentrations in sampled soil from Gunnersbury Park, Popes Lane, London, W5 4NH. Oakshire Environmental will carry out Soil Quality & Contamination Testing, as described below.

1.2 Purpose of Investigation

The objectives of the Soil Quality & Contamination Testing will be to:

- Identify chemical and physical properties of sampled soil.
- Assess the risk to human health and the environment.
- Assess the impact of entertainment events on identified contamination and nutrients.
- Determine the requirement for further investigations or remediation.

1.3 Scope of Work

- Brief introductory information will be noted to provide context to the report and will include an Introduction, Project Overview, Scope of Work and Limitations.
- In order to identify chemical and physical properties of sampled soil, 10 x samples will be taken from soil at the site and analysed for pH, Nitrogen, Extractable Potassium, Extractable Magnesium, Extractable Phosphate, Metals (As,Be,Cd,Cu,Pb,Hg,Ni,Se,V,Zn), Chromium (III & VI), Phenols, Polycyclic Aromatic Hydrocarbons (USEPA 16), BTEX & MTBE and Total Petroleum Hydrocarbons (TPHs) CWG (Aliphatic/ Aromatic) in a UKAS accredited laboratory.
- Results of laboratory testing will be assessed with reference to suitable screening values, including Defra Soil Index, British Standard Institute specification for topsoil (BS 3882:2015) and 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 and the impact of entertainment events on identified contamination and nutrient concentrations.
- 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 Gunnersbury Park, Popes Lane, London, W5 4NH and comprises Gunnersbury Park and associated park land, buildings, sports facilities and amenities.

National Grid Reference: TQ 18689 79126

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

Ten soil samples were taken at the locations shown on plans in the appendix, with ground conditions noted during the sampling process to inform recommendations and conclusions.

Sample locations were chosen to focus on site use areas, while providing coverage of across the site, with sample depths chosen to allow identification of variability through the soil profile and to represent the soil that is most likely to impact future site users through inhalation, ingestion and dermal contact pathways.

Soil samples were collected using a window sampler and soil was then collected from the sampler 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. Sampling equipment was wiped clean between sample locations to minimise cross contamination.

3.2 Health & Safety

When collecting soil samples on a potentially contaminated site it must be assumed that the soil is contaminated in order to protect the health of the assessor. Protective rubber gloves were worn at all times as well as substantial footwear. Equipment was washed thoroughly before and after use and kept in a container when transported to avoid the spread of any possible contamination. Sample containers were packed with biodegradable fill for protection and placed in a sealed plastic container for transportation to the laboratory.

3.3 Testing Methodology

UKAS accredited laboratory testing included a comprehensive suite of contaminants and nutrients, including pH, Nitrogen, Extractable Potassium, Extractable Magnesium, Extractable Phosphate, Metals (As,Be,Cd,Cu,Pb,Hg,Ni,Se,V,Zn), Chromium (III & VI), Phenols, Polycyclic Aromatic Hydrocarbons (USEPA 16), BTEX & MTBE and Total Petroleum Hydrocarbons (TPHs) CWG (Aliphatic/ Aromatic).

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 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

- Heavy metal concentrations were low in all samples
- pH was acidic in all samples
- Phenols concentrations were below the laboratory limit of detection in all samples
- Polycyclic Aromatic Hydrocarbons (PAHs) concentrations were very low in all samples
- 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, S04, S05, S06, S07, S08, S09 and S10 and were very low in samples S02 and S03
- Density values were within a typical range for topsoil in all samples, suggesting the soil density would not limit plant roots or the movement of water and nutrients
- Total Nitrogen values were suitable in samples S01, S02, S03, S04, S07, S08, S09 and S10, however, samples S05 and S06 were deficient
- Potassium concentrations were suitable in samples S01, S03, S04 and S09, however, samples S02, S05, S06, S07, S08 and S10 were deficient
- Phosphate concentrations were suitable in all samples
- Magnesium concentrations were suitable in samples S01, S02, S03, S04, S05, S06, S08, S09 and S10, however, sample S07 was deficient

4.3 Conclusions

Based on the results of laboratory testing and continued public open space land use, sampled soil is considered to be uncontaminated, suggesting a low risk to human health and the environment, in addition, sampled soil density was within a typical range for topsoil, suggesting the soil density would not limit plant roots or the movement of water and nutrients, however, samples taken from 'Green Triangle', 'North Playing Fields', 'South Playing Fields' and 'Old Cricket Pitch' were found to have nutrient deficiencies.

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>.

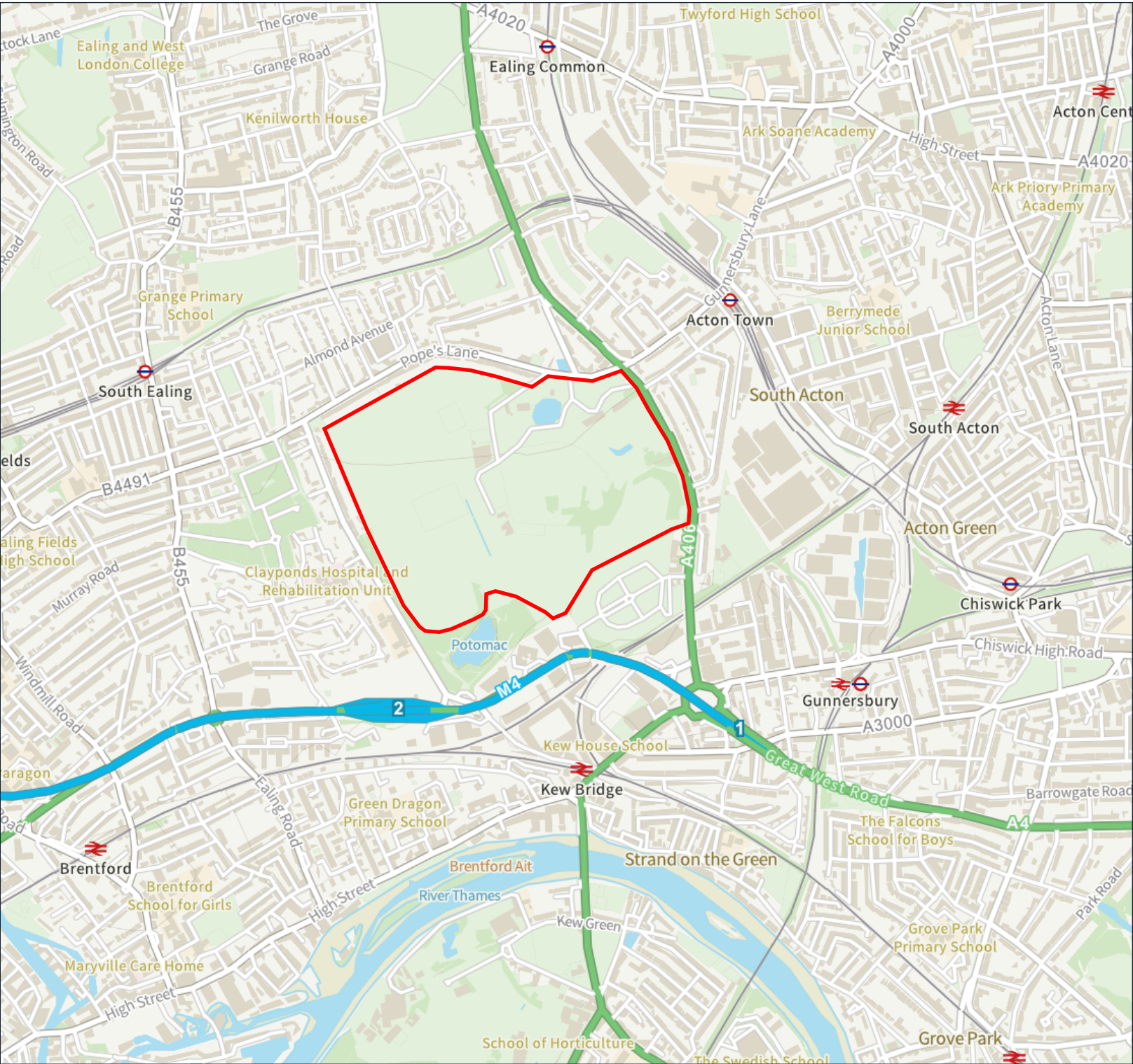
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USEPA. *Regional Screening Levels (RSLs)*. [online] Available at: <epa.gov/risk/regional-screening-levels-rsls>.




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

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



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



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



Appendix - Site Photos

Description

Photo showing the location of sample S01

Sources

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Appendix - Site Photos

Description

Photo showing sample S01

Sources

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Appendix - Site Photos

Description

Photo showing the location of sample S02

Sources

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Appendix - Site Photos

Description

Photo showing sample S02

Sources

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Appendix - Site Photos

Description

Photo showing the location of sample S03

Sources

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Appendix - Site Photos

Description

Photo showing sample S03

Sources

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Appendix - Site Photos

Description

Photo showing the location of sample S04

Sources

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Appendix - Site Photos

Description

Photo showing sample S04

Sources

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Appendix - Site Photos

Description

Photo showing the location of sample S05

Sources

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Appendix - Site Photos

Description

Photo showing sample S05

Sources

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Appendix - Site Photos

Description

Photo showing the location of sample S06

Sources

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Appendix - Site Photos

Description

Photo showing sample S06

Sources

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Appendix - Site Photos

Description

Photo showing the location of sample S07

Sources

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Appendix - Site Photos

Description

Photo showing sample S07

Sources

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Appendix - Site Photos

Description

Photo showing the location of sample S08

Sources

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Appendix - Site Photos

Description

Photo showing sample S08

Sources

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Appendix - Site Photos

Description

Photo showing the location of sample S09

Sources

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Appendix - Site Photos

Description

Photo showing sample S09

Sources

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Appendix - Site Photos

Description

Photo showing the location of sample S10

Sources

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Appendix - Site Photos

Description

Photo showing sample S10

Sources

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Sample Location		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10
Sample Depth (m)		0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30	0.10 - 0.30
Sampling Date		09/01/2024	09/01/2024	09/01/2024	09/01/2024	09/01/2024	09/01/2024	09/01/2024	09/01/2024	09/01/2024	09/01/2024
Determinand	Units										
Soil sample preparation parameters											
Moisture Content	%	15.3	13.1	12.9	12.2	9.6	11.1	14.0	16.4	14.7	14.9
Material removed	%	< 0.1	< 0.1	10.4	< 0.1	25.3	21.8	14.0	< 0.1	< 0.1	< 0.1
Description of Inert material removed		None	None	Stones	None	Stones	Stones	Stones	None	None	None
Metals											
Arsenic	mg/kg	10.9	12.9	19.0	10.6	19.5	14.5	12.9	15.7	17.5	11.6
Beryllium	mg/kg	0.9	0.9	0.9	0.6	0.7	0.7	0.7	0.6	0.7	0.7
Cadmium	mg/kg	0.3	0.2	0.3	< 0.2	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	mg/kg	15.4	18.3	19.0	17.9	19.0	22.2	19.2	14.4	17.0	15.7
Chromium (III)	mg/kg	15.4	18.3	19.0	17.9	19.0	22.2	19.2	14.4	17.0	15.7
Copper	mg/kg	80.1	52.9	53.6	38.2	38.0	34.5	29.4	78.5	61.1	53.7
Lead	mg/kg	154	194	251	115	145	107	122	132	291	185
Mercury	mg/kg	0.5	0.6	0.7	0.4	0.6	0.5	0.4	0.6	0.8	0.9
Nickel	mg/kg	13.5	17.2	18.0	13.9	12.7	13.9	11.5	12.2	15.9	15.1
Selenium	mg/kg	< 1.0	< 1.0	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	mg/kg	28.6	37.1	35.6	30.8	30.0	31.5	30.0	26.6	32.6	31.9
Zinc	mg/kg	72.1	73.9	95.6	61.2	68.0	59.4	52.4	56.2	70.6	136
Inorganics											
Hexavalent Chromium	mg/kg	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Miscellaneous											
pH	pH units	6.1	5.7	6.3	5.3	5.8	6.6	5.4	5.9	6.3	6.2
Density	g/ml	1.24	1.27	1.28	1.22	1.28	1.25	1.27	1.27	1.20	1.31
Total Nitrogen	%	0.16	0.17	0.18	0.19	0.11	0.10	0.19	0.19	0.18	0.21
Extractable Potassium	mg/l	166	52	201	128	74	66	54	117	221	67
Extractable Magnesium	mg/l	95	94	108	66	74	55	40	141	127	122
Extractable Phosphate	mg/l	57	46	50	72	60	53	113	46	40	46
Phenols											
Phenol	mg/kg	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
M,P-Cresol	mg/kg	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
O-Cresol	mg/kg	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
3,4-Dimethylphenol	mg/kg	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2,3-Dimethylphenol	mg/kg	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2,3,5-trimethylphenol	mg/kg	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Total Monohydric Phenols	mg/kg	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Polyaromatic hydrocarbons											
Naphthalene	mg/kg	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	0.1	0.2	0.2	< 0.1	0.2	< 0.1	< 0.1	< 0.1	0.1	< 0.1
Anthracene	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	0.3	0.3	0.3	0.2	0.3	0.1	0.3	0.2	0.2	0.2
Pyrene	mg/kg	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.2
Benzo(a)anthracene	mg/kg	0.1	< 0.1	0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	0.1	0.1	0.2	< 0.1	0.2	< 0.1	0.1	< 0.1	0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	0.2	0.1	0.2	< 0.1	0.2	< 0.1	0.1	< 0.1	0.2	< 0.1
Benzo(k)fluoranthene	mg/kg	0.3	0.4	0.3	< 0.1	0.3	< 0.1	0.5	< 0.1	0.2	< 0.1
Benzo(a)pyrene	mg/kg	0.2	0.1	0.2	< 0.1	0.2	< 0.1	0.2	< 0.1	0.1	< 0.1

[illegible]

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Acid neutralisation capacity	N	Air dried sample	12/01/2024		
Extractable cations - BS3882	N	Air dried sample	12/01/2024		ICPMS
Hexavalent chromium	N	As submitted sample	12/01/2024	110	Colorimetry
pH	M	Air dried sample	12/01/2024	113	Electromeric
Phenols in solids	M	As submitted sample	12/01/2024	121	HPLC
PAH (GC-FID)	N	As submitted sample	12/01/2024	133	GC-FID
Extr. Phos	N	Air dried sample	12/01/2024	140	ICPMS
Low range Aliphatic hydrocarbons soil	N	As submitted sample	18/01/2024	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	18/01/2024	181	GC-MS
BTEX in solids	M	As submitted sample	18/01/2024	181A	GC-MS
Aliphatic hydrocarbons in soil	N	As submitted sample	12/01/2024	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	18/01/2024	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	16/01/2024	214	GC-FID
Aqua regia extractable metals	M	Air dried sample	12/01/2024	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