



RHONDDA
GEOTECHNICAL
SERVICES

CONTAMINATED LAND ASSESSMENT
M.T.C.B.C. PLANNING APP. P/19/0048
BUILDING REGULATION REF. BR/22/0121

PLOT ADJACENT TO
18 SAXON STREET
MERTHYR TYDFIL
CF47 8SP

9/06/2022

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INTRODUCTION-PURPOSES AND AIMS

Planning approval P/19/0048 from Merthyr Tydfil L.P.A. is for the construction of a detached residential property on a plot adjacent to 18 Saxon Street, Merthyr. As Condition 7, M.T.C.B.C. have indicated that they require a Contaminated Land Risk Assessment. Rhondda Geotechnical Services have been engaged to carry out this work. The exact wording of the condition is as follows:-

No development shall take place until a site investigation to determine the nature and extent of contamination has been carried out. The investigation shall include:

- i. A thorough walkover survey to identify areas of potential contamination.
- ii. At least 1 No. random soil sample taken in the location of the proposed dormer bungalow and garages.
- iii. The soil sample taken shall be tested for Arsenic, Cadmium, Chromium (total), Lead, Mercury, Selenium, Boron, Copper and Zinc, Speciated PAHs, TPH, Phenol and Asbestos.

The results of the site investigation shall be made available to the L.P.A. before any development begins. If any contamination is found during the site investigation a report specifying the measures to be taken to remediate the site to render it suitable for the development hereby permitted shall be submitted to and approved in writing by the L.P.A. The site shall be remediated in accordance with the approved measures before development begins.

Contamination Found During Development

If during the course of the development any contamination should be encountered which was not previously been identified in the site investigation, additional measures for the remediation of this source of contamination shall be submitted to and approved in writing by the LPA prior to the work recommencing. The remediation of the site shall incorporate the approved additional measures before the development is occupied.

The last paragraph is a standard unexpected contamination condition and by its nature cannot be a pre-commencement condition. It is the aim of this report to satisfactorily discharge the remainder of the condition.

The report will follow the guidelines set out in the document Development of Land Affected by Contamination: A Guide for Developers (Version 3). This was

produced by the Welsh Land Contamination Working Group in 2017. In particular the methodology set out in appendix B with the check list for Phase 2 will be followed. The contaminated land exposure assessment (henceforth CLEA) produced by The Environment Agency will be used in the conceptual model, particularly in regard to the source-pathway-receptor concept for pollutant linkages. The entire project will be guided by the 2004 Defra/E.A. document CLR11 (Model Procedures for the Management of Land Contamination).

The current definition of contaminated land is “any land which appears to the local authority in whose area it is situated in to be in such a condition, by reason of substances in or under the ground that:-

- a. “Significant harm is being caused, or there is a significant possibility of such harm being caused OR
- b. Pollution of controlled waters is being, or is likely to be caused”

(Section 78A Part 2A Environmental Protection Act)

This act also requires that a risk based approach should be used for assessing the contamination status of a site. For a site to be designated as contaminated it must be shown that the site is not fit for its current, or intended use. Statutory guidance states that a two stage approach should be adopted for the assessment of contaminated land.

- 1. Identification of potential pollution linkages
- 2. Assessment of the risk to receptors

The first stage (The Phase 1 report) is not considered necessary in this instance by M.T.C.B.C. and rightly so. An analysis of a single sample with an interpretation of the results with regard to risk to human health is considered sufficient.

1. AUTHOR CREDENTIALS

The author of this report is Richard Davies. He graduated with a Batchelor of Science honours degree in Geology from Liverpool University in 1979. After starting his career as an engineer in the coal industry, he moved into site investigation in the 1980's and has many years experience working on

contaminated land. He is a Fellow of The Geological Society and holds a Master's Degree in Applied Environmental Geology from Cardiff University. He is also a Supporter Member of CL: AIRE (Contaminated Land: Applications in Real Environments)

2. SITE DESCRIPTION

The site is centred on grid reference 304760,206965 and is at an elevation of approximately 216m-218m. A.O.D. The site is bisected by an adopted highway. A small element to the west of the highway is to be utilised for three single garages. The main part of the site on the southeast of the highway is a curved rectangular shape. This covers an area of approximately 190m² (0.019 Ha) and is surrounded by existing residential development. The site location and site boundary are shown overleaf in Figures 1 and 2.

3. SITE WALKOVER

A walkover survey is normally part of the Phase 1 Template. This really aimed at far larger sites with former industrial use where differing areas can be delineated. The site is a compact, single plot with no differing areas to be delineated. A brief description of the site is contained in the previous section.

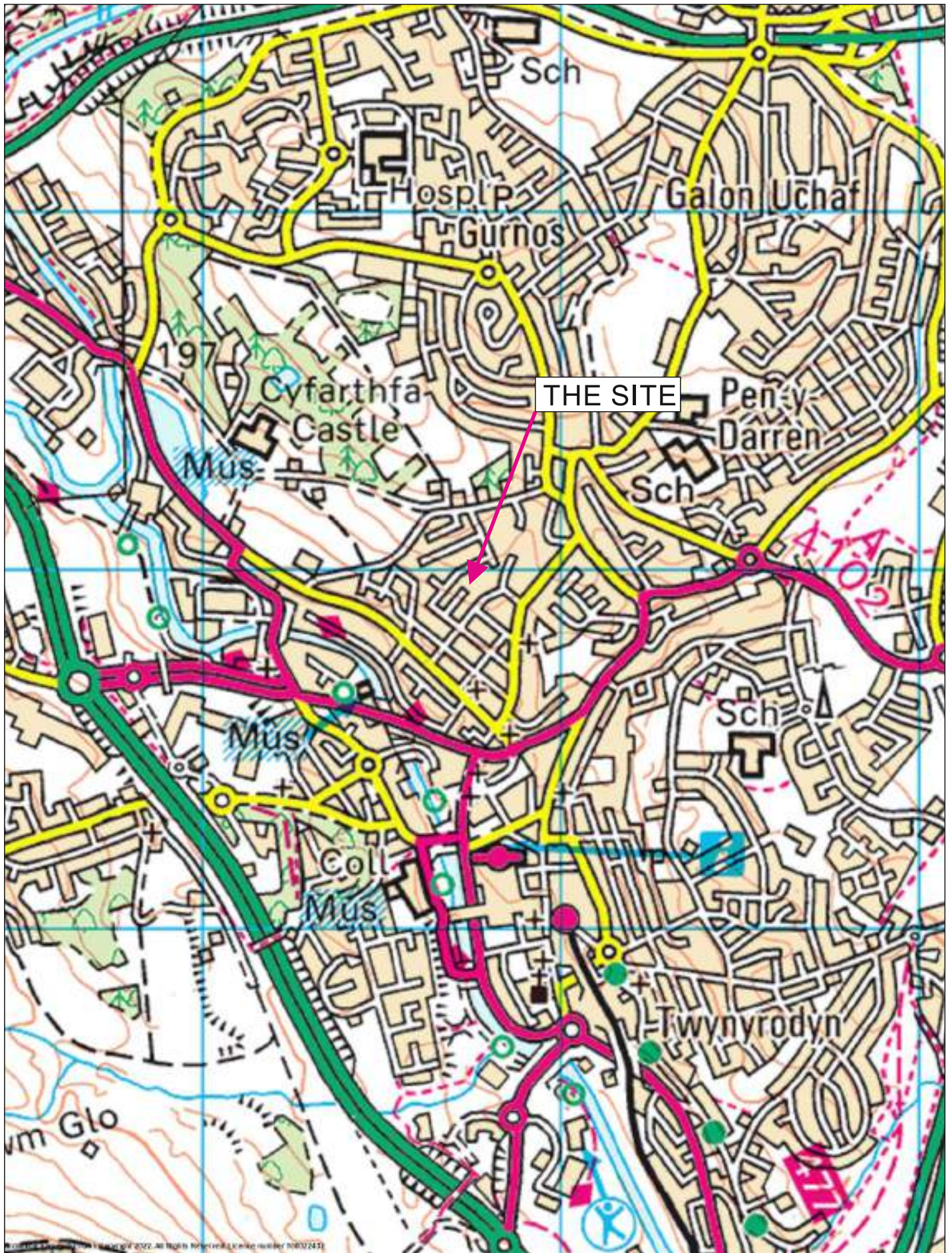


FIGURE 1
SITE LOCATION

4. SITE INVESTIGATION AND SAMPLING METHODOLOGY

The intrusive site investigations was carried out on 25th May 2022 under the supervision of Richard Davies. Work was being carried out using a JCB3CX and the opportunity was used to dig a trial pit (TP1) to obtain the sample. A second trial pit (TP2) was dug to investigate foundation conditions. The trial pit locations are shown in Figure 2 on the preceding page. This was in the proposed rear garden/soft landscaping area. The sample was taken from the Made Ground above the interface with the underlying natural ground. There was no sensory evidence of contamination in either of the pits. Groundwater was not encountered in either of the pits.

The soil sample was collected, placed in British Standard sealed containers and immediately labelled with depth, location and sample number. The sampling location had four samples taken. These comprised two one litre plastic tubs, one 60ml. amber glass jar and one 120ml. amber glass jar. This is the recommended quantity required for a broad general suite of testing. The samples were taken with a stainless steel trowel, cleaned between samples to avoid cross contamination. The samples were stored in a cool box and dispatched by courier to the laboratory the following morning. This meant that the lab was in receipt of the samples within 48 hours of them being taken, and the samples were kept under correct conditions throughout. This is important to ensure the samples are “non-deviating” particularly in the case of testing for organic contaminants.

5. TESTING STRATEGY

All the samples were tested by The Environmental Laboratory Ltd (reg. 3882193) at their laboratory in East Sussex. They hold both MCERTS and UKAS accreditation (UKAS lab no.2683). Their full details can be seen on page 1 of the laboratory report 22-40937-1. The complete report is included as Appendix A.

The testing specified by M.T.C.B.C. was basically the CLEA 2.1 Suite with the addition of an asbestos screen. For some reason Cyanide was omitted from the list but was scheduled by the author anyway. The substances tested for could be described as a broad general suite in common use in British contaminated land studies. The substances tested for can be split into two main categories. Organic and Inorganic compounds.

The inorganic contaminants tested for were metals:-

Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Zinc.

In addition, Free Cyanide was measured, and all samples were screened for Asbestos.

Total Organic Carbon and moisture were both measured. From this, a calculation is used to derive Soil Organic Matter. This is needed to risk assess levels of organic contaminants. The risk assessments for organic contaminants differ with varying S.O.M. values. A wide range of organic contaminants were tested for.

All samples were tested for P.A.H.s (Polycyclic Aromatic Hydrocarbons). Sixteen different compounds were measured. These are the USEPA16. Originating from the U.S.A. they are an internationally recognised, representative and indicative group amongst the huge number of these compounds.

T.P.H. (total petroleum hydrocarbons) analysis was split up by Carbon Banding, along conventionally normal lines (Texas Banding). An aromatic/aliphatic split analysis was also carried out to allow further speciation of any hydrocarbon contamination detected.

The analysis for Organic contaminants also included a Phenol Suite. This contained a range of six Monohydric Phenols commonly found on contaminated sites.

6. CHOICE OF SUITABLE FOR USE VALUES (S4ULs) USED IN THE REPORT

Much work has been done in recent years on human health risk assessment for exposure to contaminated land. Originally the E.A. produced figures known as Soil Guidance Values (SGVs). These were later withdrawn, and this has resulted in the production of Generic Assessment Criteria (GACs). These are figures produced for individual substances. If the concentration of a contaminant is above its GAC, there is a potential for harm to human health (or controlled waters). Each contaminant has different levels for different exposure scenarios. For example, for any given contaminant, its GAC is far higher for a commercial development than it would be for Residential Use with consumption of homegrown produce. Many GACs have been published by Contaminated Land: Applications in real environments (CL:AIRE), Land Quality Management Ltd. (LQM) and the Environmental Industries Commission (EIC).

Due to different non-government bodies producing GACS over the years since they were introduced, LQM have produced a complete revision of their figures

and renamed them Suitable for Use Levels (S4ULs). The values used in this report are S4ULs with the exception of Lead which has a Category 4 Screening Level (C4SL) produced by the Department for the Environment, Food and Rural Affairs. Cyanide is not assessed in this way, instead it has an acute GAC, rather than one modelled on long term exposure. Asbestos also has its own safety levels governing land use.

The LQM S4ULs have been derived in accordance with the changes in exposure modelling presented within the C4SL framework, whilst still using a set of toxicological criteria that are set within the “minimal risk” range. The LQM/CIEH S4ULs were published to offer a set of collated information on the toxicity and transport properties for a number of common contaminants. They are widely considered to be suitable for use in planning assessments such as this. The most recent update was published in 2017 and reflects changes in UK human health risk assessment since the previous figures were published in 2009. All the data inputs used in the derivation of the S4ULs are presented in full in the publication *LQM/CIEH Suitable 4 Use Levels*, and there is no intention to provide them here. These values are intended for use by professionals who have purchased them. To authenticate this the purchaser is supplied with an individual number to validate the report writer’s entitlement to use the LQM/CIEH S4ULs. This number can be seen on the result summary sheets in Tables 3-7. The author has the right to reproduce these values here, but they remain copyright of LQM, a specialist environmental consultancy based in Nottingham.

The proposed development consists of a single residential property. Given the nature of the development, Residential Land Use with homegrown produce S4ULs are appropriately conservative. These values have been used when analysing the results for the risk assessment of the site.

6. SUMMARY OF GROUND CONDITIONS AND TEST RESULTS

The full trial pit logs to BS5930:2015 together with photographs of the trial pits can be found in Appendix A. In summary, the five pits in the proposed garden areas were all excavated through the Made Ground into the underlying gravelly Diamicton which was encountered at depths of between 0.7m-1.7m. There were no natural organic soils present. As expected the Made Ground contained a variable, but high proportion of glassy ironworks slag. There was also brick, ash and clinker present. There was no biodegradable material in the Made Ground. Sampling was taken in the Made Ground.

A summary of the laboratory reports on the soil testing in Appendix A has been produced overleaf in Tables 3-7. These compare the test results for each substance with its relevant S4UL value (Residential Land Use with homegrown produce scenario).

With the organic contaminants, the samples are normally subdivided based on their Soil Organic Matter (S.O.M.) as the S4UL value for each organic contaminant is controlled by the S.O.M. value. The sample tested fell in the S.O.M. band >1% <2.5%.

Tables 1, 2 and 3 show that all organic contaminants were below the level of detection.

Because all the six speciated Phenols were below the level of detection in the sample, only the Phenol Index is shown in Table 3, without speciation.

With the inorganic substances in Table 4, there were no exceedances of S4UL values or the C4SL for Lead.

Cyanide levels were below the limit of detection in the sample. There was no asbestos detected in the sample.

To summarise, there is no detectable contamination in the sample taken from the Made Ground at the site. Because of this there is no remediation strategy necessary and Condition 7 (pre-commencement section) can be discharged.

Richard Davies BSc. (Hons.), MSc., F.G.S.

9/06/2022

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ALL VALUES ARE IN mg/kg

ALL S4ULs REFER TO RESIDENTIAL WITH HOMEGROWN PRODUCE SCENARIO

SOIL ORGANIC MATTER(S.O.M.)				1%	2.5%
CONTAMINANT				S4UL	TP 1 0.5m S4UL
NAPHTHALENE				2.3	<0.1
ACENAPHTHYLENE				170	<0.1
ACENAPHTHENE				210	<0.1
FLOURENE				170	<0.1
PHENANTHRENE				95	<0.1
ANTHRACENE				2400	<0.1
FLOURANTHENE				280	<0.1
PYRENE				620	<0.1
BENZO[a]ANTHRACENE				7.2	<0.1
CHRYSENE				15	<0.1
BENZO[b]FLOURANTHENE				2.6	<0.1
BENZO[k]FLOURANTHENE				77	<0.1
BENZO[a]PYRENE				2.2	<0.1
INDENO[1,2,3-cd]PYRENE				27	<0.1
DIBENZO[a,h]ANTHRACENE				0.24	<0.1
BENZO[g,h,i]PERYLINE				320	<0.1
TOTAL(USEPA 16) PAHs				N/A	<0.4
TABLE 1 POLYCYCLIC AROMATIC HYDROCARBONS (USEPA16)					

SUMMARY OF TEST RESULTS SAXON STREET, MERTHYR

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S.O.M.				1%		2.5%
CARBON BANDING				S4UL	TP 1 0.5m	S4UL
>C5-C6	ALI			42	<0.1	78
>C6-C8	ALI			100	<0.1	230
>C8-C10	ALI			27	<1	65
>C10-C12	ALI			130	<1	330
>C12-C16	ALI			1100	<1	2400
>C16-C21	ALI			65000	<1	92000
>C21-C35	ALI				<1	
>C35-C40	ALI			65000	<1	92000
TOTAL ALI	C5-C40			N/A	<1	N/A
>C5-C7	ARO			70	<0.1	140
>C7-C8	ARO			130	<0.1	290
>C8-C10	ARO			34	<1	83
>C10-C12	ARO			74	<1	180
>C12-C16	ARO			140	<1	330
>C16-C21	ARO			260	<1	540
>C21-C35	ARO			1100	<1	1500
>C35-C40	ARO			1100	<1	1500
TOTAL ARO	C5-C40			N/A	<1	N/A
TPH	C5-C40			N/A	1.5	N/A

TABLE 2 TOTAL PETROLEUM HYDROCARBONS WITH CARBON BANDING AND ALI/ARO SPLIT

SUMMARY OF TEST RESULTS SAXON STREET, MERTHYR

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ALL S4ULs REFER TO RESIDENTIAL WITH HOMEGROWN PRODUCE SCENARIO

S.O.M.				1%	2.5%
				S4UL	TP 1 0.5m S4UL
PHENOL				280	<5 550
TABLE 3 TOTAL MONOHYDRIC PHENOLS					

CONTAMINANT				TP1 0.5m	S4UL	
ARSENIC				8.6	37	
CADMIUM				<0.5	11	
CHROMIUM				16	910	
COPPER				16.6	2400	
LEAD				27.2	200	(C4SL)
MERCURY				<0.5	40	
NICKEL				14	180	
SELENIUM				<1	250	
ZINC				55.7	3700	
CYANIDE				<1.0	22	GACacute
TABLE 4 TOXIC/HEAVY METALS AND CYANIDE						

	TP1 0.5m					
WEIGHT (g)	0					
% DRY WEIGHT OF SAMPLE	0					
TABLE 5 ASBESTOS ANALYSIS						

SUMMARY OF TEST RESULTS SAXON STREET, MERTHYR

APPENDIX A
ELAB REPORT
22-40937-1
SAXON STREET
MERTHYR



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 22-40937

Issue: 1

Date of Issue: 07/06/2022

Contact: Richard Davies

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56 Meyler Street
Thomastown
Porth
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Quotation No: Q22-02726

Order No: Not Supplied

Customer Reference: SX25

Date Received: 27/05/2022

Date Approved: 07/06/2022

Details: Saxon St

Approved by:

Catherine Biddiss, Organics Laboratory Manager

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Sample Summary

Report No.: 22-40937, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
281356	TP1 0.50	25/05/2022	27/05/2022	Silty loam	

Results Summary

Report No.: 22-40937, issue number 1

ELAB Reference	281356
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	TP1
Sample Depth (m)	0.50
Sampling Date	25/05/2022

Determinand	Codes	Units	LOD	
Soil sample preparation parameters				
Moisture Content	N	%	0.1	22.3
Material removed	N	%	0.1	6.9
Description of Inert material removed	N		0	Stones
Metals				
Arsenic	M	mg/kg	1	8.6
Cadmium	M	mg/kg	0.5	< 0.5
Chromium	M	mg/kg	5	16.0
Copper	M	mg/kg	5	16.6
Lead	M	mg/kg	5	27.2
Mercury	M	mg/kg	0.5	< 0.5
Nickel	M	mg/kg	5	14.0
Selenium	M	mg/kg	1	< 1.0
Zinc	M	mg/kg	5	55.7
Inorganics				
Total Cyanide	M	mg/kg	1	< 1.0
Miscellaneous				
pH	M	pH units	0.1	7.2
Soil Organic Matter	U	%	0.1	2.1
Total Organic Carbon	N	%	0.01	1.4
Phenols				
Phenol	M	mg/kg	1	< 1
M,P-Cresol	N	mg/kg	1	< 1
O-Cresol	N	mg/kg	1	< 1
3,4-Dimethylphenol	N	mg/kg	1	< 1
2,3-Dimethylphenol	M	mg/kg	1	< 1
2,3,5-trimethylphenol	M	mg/kg	1	< 1
Total Monohydric Phenols	N	mg/kg	5	< 5
Polyaromatic hydrocarbons				
Naphthalene	M	mg/kg	0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	< 0.1
Anthracene	M	mg/kg	0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	< 0.1
Pyrene	M	mg/kg	0.1	< 0.1
Benzo(a)anthracene	M	mg/kg	0.1	< 0.1
Chrysene	M	mg/kg	0.1	< 0.1
Benzo(b)fluoranthene	M	mg/kg	0.1	< 0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	< 0.1
Benzo(a)pyrene	M	mg/kg	0.1	< 0.1
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	< 0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	< 0.1
Total PAH(16)	M	mg/kg	0.4	< 0.4

Results Summary

Report No.: 22-40937, issue number 1

ELAB Reference	281356
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	TP1
Sample Depth (m)	0.50
Sampling Date	25/05/2022

Determinand	Codes	Units	LOD	
TPH CWG				
>C5-C6 Aliphatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01
>C6-C8 Aliphatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01
>C8-C10 Aliphatic (HS_1D_MS+EH_2D_AL)	N	mg/kg	1	< 1.0
>C10-C12 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0
>C12-C16 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0
>C16-C21 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0
>C21-C35 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0
>C35-C40 Aliphatic (EH_2D_AL)	M	mg/kg	1	< 1.0
Total aliphatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AL)	N	mg/kg	1	< 1.0
>C5-C7 Aromatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01
>C7-C8 Aromatic (HS_1D_MS)	N	mg/kg	0.01	< 0.01
>C8-C10 Aromatic (HS_1D_MS+EH_2D_AR)	N	mg/kg	1	< 1.0
>C10-C12 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0
>C12-C16 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0
>C16-C21 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0
>C21-C35 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0
>C35-C40 Aromatic (EH_2D_AR)	M	mg/kg	1	< 1.0
Total aromatic hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_AR)	N	mg/kg	1	< 1.0
Total petroleum hydrocarbons (>C5 - C40) (HS_1D_MS+EH_2D_Total)	N	mg/kg	1	< 1.0



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Results Summary

Report No.: 22-40937, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type	Free Fibre Analysis (%)	Total Asbestos (%)
281356	0.50	TP1	Brown sandy soil, stones	No asbestos detected	n/t	n/t	n/t	n/t



2683

Method Summary

Report No.: 22-40937, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	07/06/2022	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	06/06/2022	118	ICPMS
Phenols in solids	M	As submitted sample	30/05/2022	121	HPLC
PAH (GC-FID)	M	As submitted sample	30/05/2022	133	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	01/06/2022	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	01/06/2022	181	GC-MS
Total cyanide	M	As submitted sample	01/06/2022	204	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	31/05/2022	210	IR
TPH CWG soil by gc-gc	M	As submitted sample	27/05/2022	271	
Asbestos identification	U	Air dried sample	07/06/2022	280	Microscopy
Soil organic matter	U	Air dried sample	01/06/2022	BS1377:P3	Titrimetry

Tests marked N are not UKAS accredited

Report Information

Report No.: 22-40937, issue number 1

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. ELAB are unable to provide an interpretation or opinion on the content of this report. 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