



GROUNDTECH
CONSULTING

Job title: Avro Mill, Manchester

Report type: Cover System Validation
Report

Prepared for: Urban Splash

Date: March 2021

Document Control Form

PROJECT

AVRO MILL, MANCHESTER

REPORT NAME

COVER SYSTEM VALIDATION REPORT – COMMUNAL GARDEN AREAS

REPORT REFERENCE

GRO-18042-2315

STATUS

FINAL

ISSUE DATE

29 MARCH 2021

REVISION

CLIENT

URBAN SPLASH

CLIENT CONTACT

CRAIG WILLIAMSON

For and Behalf of Groundtech Consulting

SIGNATURE



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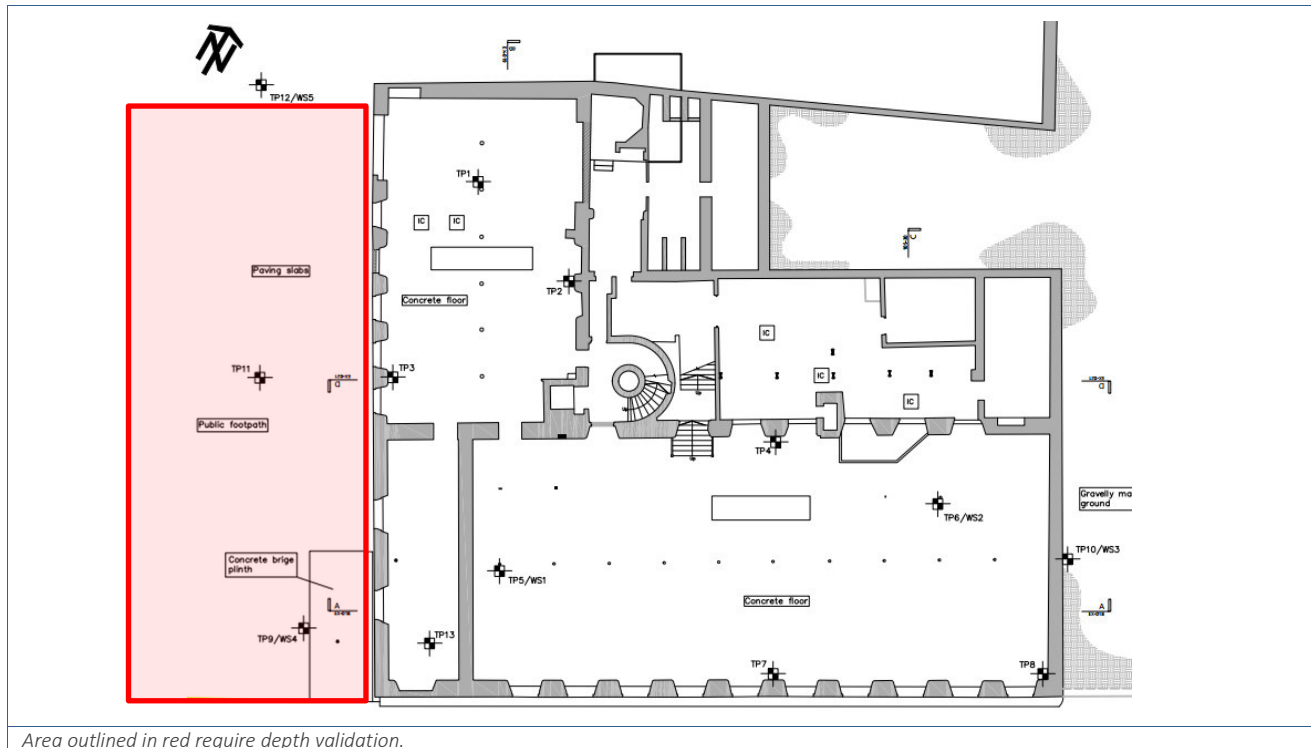


REVIEWED

James Doyle BSc (Hons) CGeol FGS

Introduction

Groundtech Consulting visited the development at Avro Mill in Manchester to validate the depth of the cover placed in the communal Garden area to the west of the building as outlined by the Brownfield Solutions Geo-Environmental Assessment Report and shown in the below extract.



Please find below a Cover System Validation Report in accordance with the agreed scope of works.

Site Works

Groundtech Consulting carried out the following site visits:

- *23rd March 2021 to validate the depth and placement of the cover system in the communal garden areas.*

Geo-Environmental Testing Results

The clean subsoil and topsoil used within the plots was imported to the site from another source with testing results for the imported material being provided by Urban Splash.

During the depth validation, samples were also collected of both the subsoil and topsoil (Plot 1 to Plot 5) used in the communal garden areas and were tested by Groundtech for a suite of heavy metals, asbestos, speciated Polycyclic Aromatic Hydrocarbons (PAHs) and Total Petroleum Hydrocarbons (TPH CWG) as set out in the Geo-Environmental Assessment Report. The assessment does not propose a sampling frequency for imported material, however typically a minimum frequency of 3 samples per 500m³ from a greenfield source and 5 samples per 250m³ from a brownfield source is accepted.

Based on the depth of cover recorded and area of the communal garden area, less than 250m³ of each material is estimated to have been imported to site.

The results of the samples tested were all below the relevant Tier 1 Screening Value for Residential end use without Plant Uptake.

Cover System Depth Validation

The depth of clean cover required across the communal garden area is 450mm comprising a minimum of 150mm topsoil with a warning geo-membrane as specified by the BSL Geo-Environmental Assessment Report.

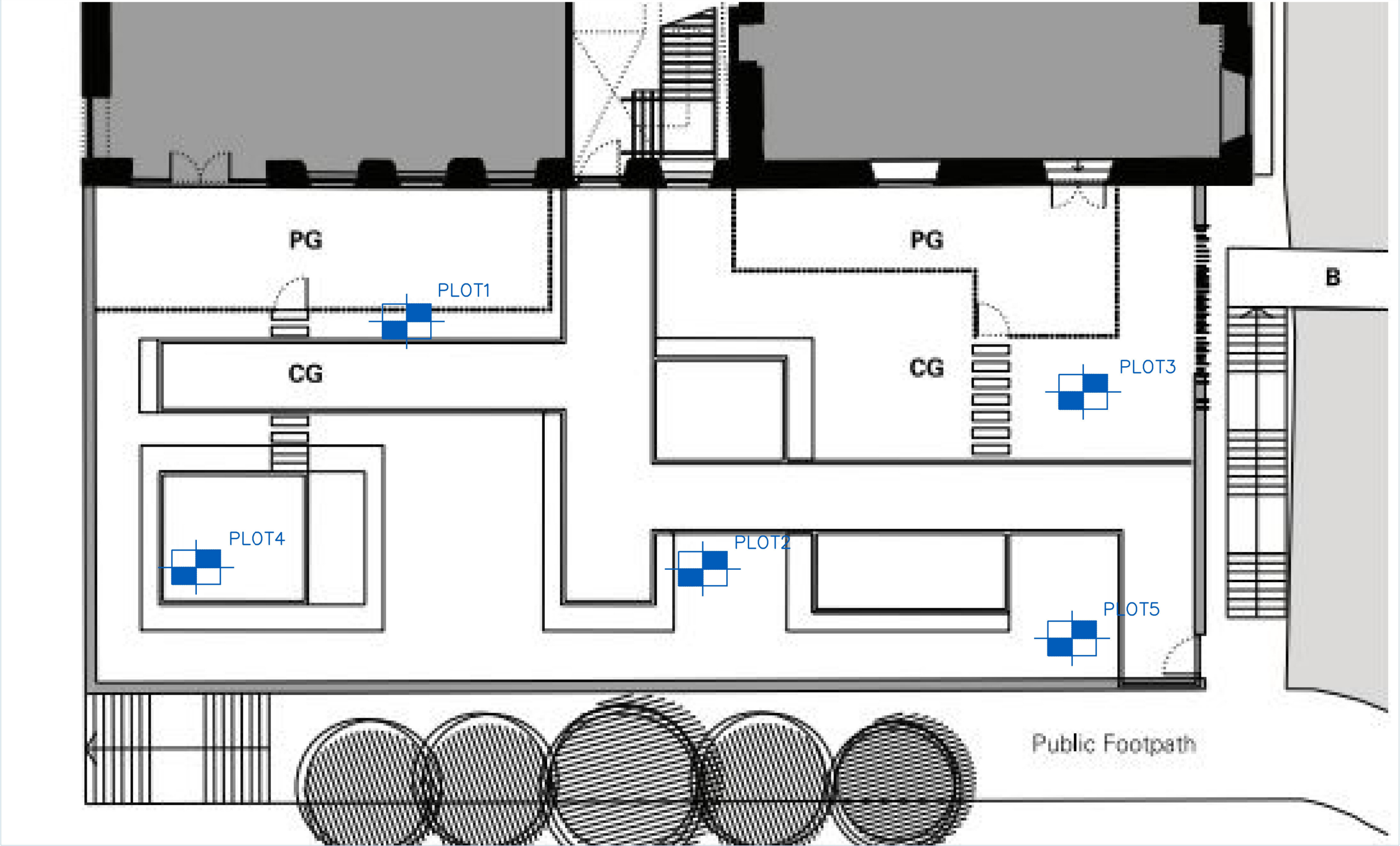
Inspection pits were excavated by hand in five locations to confirm the placement of the cover system in the communal garden area. Photographs are appended to this report which verify the presence of at least 450mm of cover system comprising a minimum of 150mm of topsoil and the warning geo-membrane.

Conclusions

The material used for the cover system was all material imported to site deemed suitable for reuse by both the imported testing results provided, and the testing undertaken by Groundtech Consulting. The depth validation excavations in garden areas confirm the presence of at least 450mm cover comprising a minimum of 150mm of topsoil and membrane.



PLANS



GROUNDTECH CONSULTING	CLIENT	DATE			Status		Notes Hand Excavated Validation Pit
	URBAN SPLASH	MARCH 2021			Preliminary		
	PROJECT TITLE	SCALE			Draft		
	AVRO MILL	NTS			Issued		
	PLAN TITLE	PLAN NUMBER			For Comment		
	COVER SYSTEM VALIDATION PLAN	GRO-18042-P01	Rev.	Details	Date	Approved	



SCREENING VALUES FOR RESIDENTIAL END USE WITHOUT PLANT UPTAKE

Proposed End Use	Unit	Residential with Plant Uptake			Residential without plant uptake			Source
SOM	%	1	2.5	6	1	2.5	6	
Arsenic	mg/kg	32	32	32	40	40	40	SGVs
Beryllium	mg/kg	1.7	1.7	1.7	1.7	1.7	1.7	LQM S4ULs
Boron (water soluble)	mg/kg	290	290	290	11000	11000	11000	LQM S4ULs
Cadmium	mg/kg	10	10	10	85	85	85	SGVs
Chromium (Total)	mg/kg	910	910	910	910	910	910	LQM S4ULs
Chromium (VI)	mg/kg	21	21	21	-	-	-	DEFRA C4SLs
Copper	mg/kg	2400	2400	2400	7100	7100	7100	LQM S4ULs
Lead	mg/kg	200	200	200	310	310	310	DEFRA C4SLs
Mercury	mg/kg	1	1	1	1.2	1.2	1.2	SGVs
Nickel	mg/kg	130	130	130	180	180	180	SGVs
Selenium	mg/kg	350	350	350	430	430	430	SGVs
Vanadium	mg/kg	410	410	410	1200	1200	1200	LQM S4ULs
Zinc	mg/kg	3700	3700	3700	40000	40000	40000	LQM S4ULs
Aliphatic EC 5 - 6	mg/kg	42	78	160	42	78	160	LQM S4ULs
Aliphatic EC 6 - 8	mg/kg	100	230	530	100	230	530	LQM S4ULs
Aliphatic EC 8 - 10	mg/kg	27	65	150	27	65	150	LQM S4ULs
Aliphatic EC 10 - 12	mg/kg	130 (48) ^{vap}	330 (118) ^{vap}	760 (283) ^{vap}	130 (48) ^{vap}	330 (118) ^{vap}	770 (283) ^{vap}	LQM S4ULs
Aliphatic EC 12 - 16	mg/kg	1100 (24) ^{sol}	2400 (59) ^{sol}	4300 (142) ^{sol}	1100 (24) ^{sol}	2400 (59) ^{sol}	4400 (142) ^{sol}	LQM S4ULs
Aliphatic EC 16 - 35	mg/kg	65000 (8.48) ^{f,sol}	92000 (21) ^{f,sol}	110000 ^f	65000 (8.48) ^{f,sol}	92000 (21) ^{f,sol}	110000 ^f	LQM S4ULs
Aliphatic EC 35 - 44	mg/kg	65000 (8.48) ^{f,sol}	92000 (21) ^{f,sol}	110000 ^f	65000	92000 (21) ^{f,sol}	110000 ^f	LQM S4ULs
Aromatic EC 5 - 7	mg/kg	70	140	300	370	690	1400	LQM S4ULs
Aromatic EC 7 - 8	mg/kg	130	290	660	860	1800	3900	LQM S4ULs
Aromatic EC 8 - 10	mg/kg	34	83	190	47	110	270	LQM S4ULs
Aromatic EC 10 - 12	mg/kg	74	180	380	250	590	1200	LQM S4ULs
Aromatic EC 12 - 16	mg/kg	140	330	660	1800	2300	2500	LQM S4ULs
Aromatic EC 16 - 21	mg/kg	260 ^f	540 ^f	930 ^f	1900	1900	1900	LQM S4ULs
Aromatic EC 21 - 35	mg/kg	1100 ^f	1500 ^f	1700 ^f	1900	1900	1900	LQM S4ULs
Aromatic EC 35 - 44	mg/kg	1100 ^f	1500 ^f	1700 ^f	1900	1900	1900	LQM S4ULs
Benzene	mg/kg	0.33	0.33	0.33	0.38	0.7	1.4	SGVs
Toluene	mg/kg	610	610	610	880	1900	3900	SGVs
Ethyl Benzene	mg/kg	350	350	350	83	190	440	SGVs
Xylene - o	mg/kg	250	250	250	88	210	480	SGVs
Xylene - m	mg/kg	240	240	240	82	190	450	SGVs
Xylene - p	mg/kg	230	230	230	79	180	430	SGVs
MTBE (methyl tert-butyl ether)	mg/kg	49	84	160	-	-	-	CL:AIRE 2010
Acenaphthene	mg/kg	210	510	1100	3000	4700	6000	LQM SAULs
Acenaphthylene	mg/kg	170	420	920	2900	4600	6000	LQM S4ULs
Anthracene	mg/kg	2400	5400	11000	31000	35000	37000	LQM S4ULs
Benzo(a)anthracene	mg/kg	7.2	11	13	11	14	15	LQM S4ULs
Benzo(a)pyrene	mg/kg	2.2	2.7	5*	3.2	3.2	3.2	DEFRA C4SL*/LQM S4ULs
Benzo(b)fluoranthene	mg/kg	2.6	3.3	3.7	3.9	4	4	LQM S4ULs
Benzo(ghi)perylene	mg/kg	320	340	350	360	360	360	LQM S4ULs
Benzo(k)fluoranthene	mg/kg	77	93	100	110	110	110	LQM S4ULs
Chrysene	mg/kg	15	22	27	30	31	32	LQM S4ULs
Dibenzo(ah)anthracene	mg/kg	0.24	0.28	0.3	0.31	0.32	0.32	LQM S4ULs
Fluoranthene	mg/kg	280	560	890	1500	1600	1600	LQM S4ULs
Fluorene	mg/kg	170	400	860	2800	3800	4500	LQM S4ULs
Indeno(123-cd)pyrene	mg/kg	27	36	41	45	46	46	LQM S4ULs
Naphthalene	mg/kg	2.3 ^f	5.6 ^f	13 ^f	2.3	5.6	13	LQM S4ULs
Phenanthrene	mg/kg	95	220	440	1300	1500	1500	LQM S4ULs
Pyrene	mg/kg	620	1200	2000	3700	3800	3800	LQM S4ULs

Proposed End Use	Unit	Residential with Plant Uptake			Residential without plant uptake			Source
SOM	%	1	2.5	6	1	2.5	6	
Phenols	mg/kg	420	420	420	-			SGVs
Chlorophenols	mg/kg	0.87 ^s	2	4.5	-			LQM S4ULs
Pentachlorophenol	mg/kg	0.22	0.52	1.2	-			LQM S4ULs
Carbon disulphide	mg/kg	0.14	0.29	0.62	-			LQM S4ULs
Hexachlorobutadiene	mg/kg	0.29	0.7	1.6	-			LQM S4ULs
1,1,1,2-Tetrachloroethane	mg/kg	1.6	3.4	7.5	-			LQM S4ULs
1,1,1-Trichloroethane	mg/kg	8.8	18	39	-			LQM S4ULs
Trichloroethene	mg/kg	0.016	0.034	0.075	-			LQM S4ULs
Tetrachloromethane (Carbon Tetrachloride)	mg/kg	0.026	0.056	0.13	-			LQM S4ULs
1,2-Dichloroethane	mg/kg	0.0071	0.011	0.019	-			LQM S4ULs
Chloroethene (Vinyl chloride)	mg/kg	0.00064	0.00087	0.0014	-			LQM S4ULs
Trichloromethane (Chloroform)	mg/kg	0.91	1.7	3.4	-			LQM S4ULs
Tetrachloroethene	mg/kg	0.18	0.39	0.9	-			LQM S4ULs
Hexachlorobenzene	mg/kg	1.8 (0.2) ^{vap}	3.3 (0.5) ^{vap}	4.9	-			LQM S4ULs
Pentachlorobenzene	mg/kg	5.8	12	22	-			LQM S4ULs
1,2,4,5-Tetrachlorobenzene	mg/kg	0.33	0.77	1.6	-			LQM S4ULs
1,2,3,5-Tetrachlorobenzene	mg/kg	0.66	1.69	3.7	-			LQM S4ULs
1,2,3,4-Tetrachlorobenzene	mg/kg	15	36	78	-			LQM S4ULs
1,3,5-Trichlorobenzene	mg/kg	0.33	0.81	1.9	-			LQM S4ULs
1,2,4-Trichlorobenzene	mg/kg	2.6	6.4	15	-			LQM S4ULs
1,2,3-Trichlorobenzene	mg/kg	1.5	3.6	8.6	-			LQM S4ULs
1,4-dichlorobenzene	mg/kg	61 ^f	150 ^f	350 ^f	-			LQM S4ULs
1,3-dichlorobenzene	mg/kg	0.4	1	2.3	-			LQM S4ULs
1,2-Dichlorobenzene	mg/kg	23	55	130	-			LQM S4ULs
Chlorobenzene	mg/kg	0.46	1	2.4	-			LQM S4ULs
Gamma-Hexachlorocyclohexanes	mg/kg	0.06	0.14	0.33	-			LQM S4ULs
Beta-Hexachlorocyclohexane	mg/kg	0.085	0.2	0.46	-			LQM S4ULs
Alpha-Hexachlorocyclohexane	mg/kg	0.23	0.55	1.2	-			LQM S4ULs
Beta-Endosulfan	mg/kg	7	17	39	-			LQM S4ULs
Alpha-Endosulfan	mg/kg	7.4	18	41	-			LQM S4ULs
Dichlorvos	mg/kg	0.032	0.066	0.14	-			LQM S4ULs
Atrazine	mg/kg	3.3	7.6	17.4	-			LQM S4ULs
Dieldrin	mg/kg	0.97	2	3.5	-			LQM S4ULs
Aldrin	mg/kg	5.7	6.6	7.1	-			LQM S4ULs
HMX	mg/kg	5.7	13	26	-			LQM S4ULs
2,4,6-Trinitrotoulene	mg/kg	1.6	3.7	8.1	-			LQM S4ULs
RDX	mg/kg	120	250	540	-			LQM S4ULs

^{sol} S4UL exceeds the solubility saturation limit (which is presented in brackets)

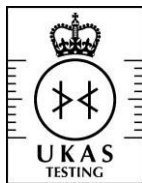
^{vap} S4ULs presented exceeds the vapour saturation limit, which is presented in brackets

^f For naphthalene, the S4UL is based on a comparison of inhalation exposure with the TDI_{inhal} for localised effects

^f S4UL based on comparison of inhalation exposure with inhalation TDI for localised effects

^{dir} S4ULs based on a threshold protective direct skin contact with phenol (guideline in brackets based on health effects following long term exposure provided for illustration only)

IMPORTED SOIL TESTING RESULTS



2183

Final Report

Report No.:	21-00412-1		
Initial Date of Issue:	22-Jan-2021		
Client	Huperade Ltd		
Client Address:	Bridge House Farm Brooks Drive Timperley Cheshire WA15 7DQ		
Contact(s):	Lesley Cox		
Project	Soil Testing		
Quotation No.:		Date Received:	11-Jan-2021
Order No.:		Date Instructed:	11-Jan-2021
No. of Samples:	3		
Turnaround (Wkdays):	10	Results Due:	22-Jan-2021
Date Approved:	22-Jan-2021		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Soil

Project: Soil Testing

Client: Huperade Ltd	Chemtest Job No.:				21-00412	21-00412	21-00412
Quotation No.:	Chemtest Sample ID.:				1122307	1122308	1122309
	Client Sample ID.:				1	2	3
	Sample Type:				SOIL	SOIL	SOIL
	Asbestos Lab:						COVENTRY
Determinand	Accred.	SOP	Units	LOD			
ACM Type	U	2192		N/A			-
Asbestos Identification	U	2192		N/A			No Asbestos Detected
ACM Detection Stage	U	2192		N/A			-
Moisture	N	2030	%	0.020	14	11	
Stones and Removed Materials	N	2030	%	0.020		< 0.020	
pH	U	2010		4.0		[A] 8.0	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		[A] 1.1	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] 0.13	
Cyanide (Free)	U	2300	mg/kg	0.50		[A] < 0.50	
Cyanide (Total)	U	2300	mg/kg	0.50		[A] < 0.50	
Thiocyanate	U	2300	mg/kg	5.0		[A] < 5.0	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50		[A] 4.5	
Sulphate (Total)	U	2430	%	0.010		[A] 0.14	
Arsenic	U	2450	mg/kg	1.0		13	
Cadmium	U	2450	mg/kg	0.10		0.31	
Chromium	U	2450	mg/kg	1.0		22	
Copper	U	2450	mg/kg	0.50		60	
Mercury	U	2450	mg/kg	0.10		0.53	
Nickel	U	2450	mg/kg	0.50		15	
Lead	U	2450	mg/kg	0.50		110	
Selenium	U	2450	mg/kg	0.20		0.33	
Zinc	U	2450	mg/kg	0.50		110	
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50	
Organic Matter	U	2625	%	0.40		[A] 3.8	
Naphthalene	U	2700	mg/kg	0.10		[A] < 0.10	
Acenaphthylene	U	2700	mg/kg	0.10		[A] < 0.10	
Acenaphthene	U	2700	mg/kg	0.10		[A] < 0.10	
Fluorene	U	2700	mg/kg	0.10		[A] < 0.10	
Phenanthrene	U	2700	mg/kg	0.10		[A] 2.2	
Anthracene	U	2700	mg/kg	0.10		[A] 0.48	
Fluoranthene	U	2700	mg/kg	0.10		[A] 2.8	
Pyrene	U	2700	mg/kg	0.10		[A] 2.9	
Benzo[a]anthracene	U	2700	mg/kg	0.10		[A] 1.4	
Chrysene	U	2700	mg/kg	0.10		[A] 1.4	
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		[A] 1.7	
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		[A] 0.85	
Benzo[a]pyrene	U	2700	mg/kg	0.10		[A] 1.6	
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		[A] 1.1	
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		[A] 0.49	
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		[A] 1.2	

Results - Soil

Project: Soil Testing

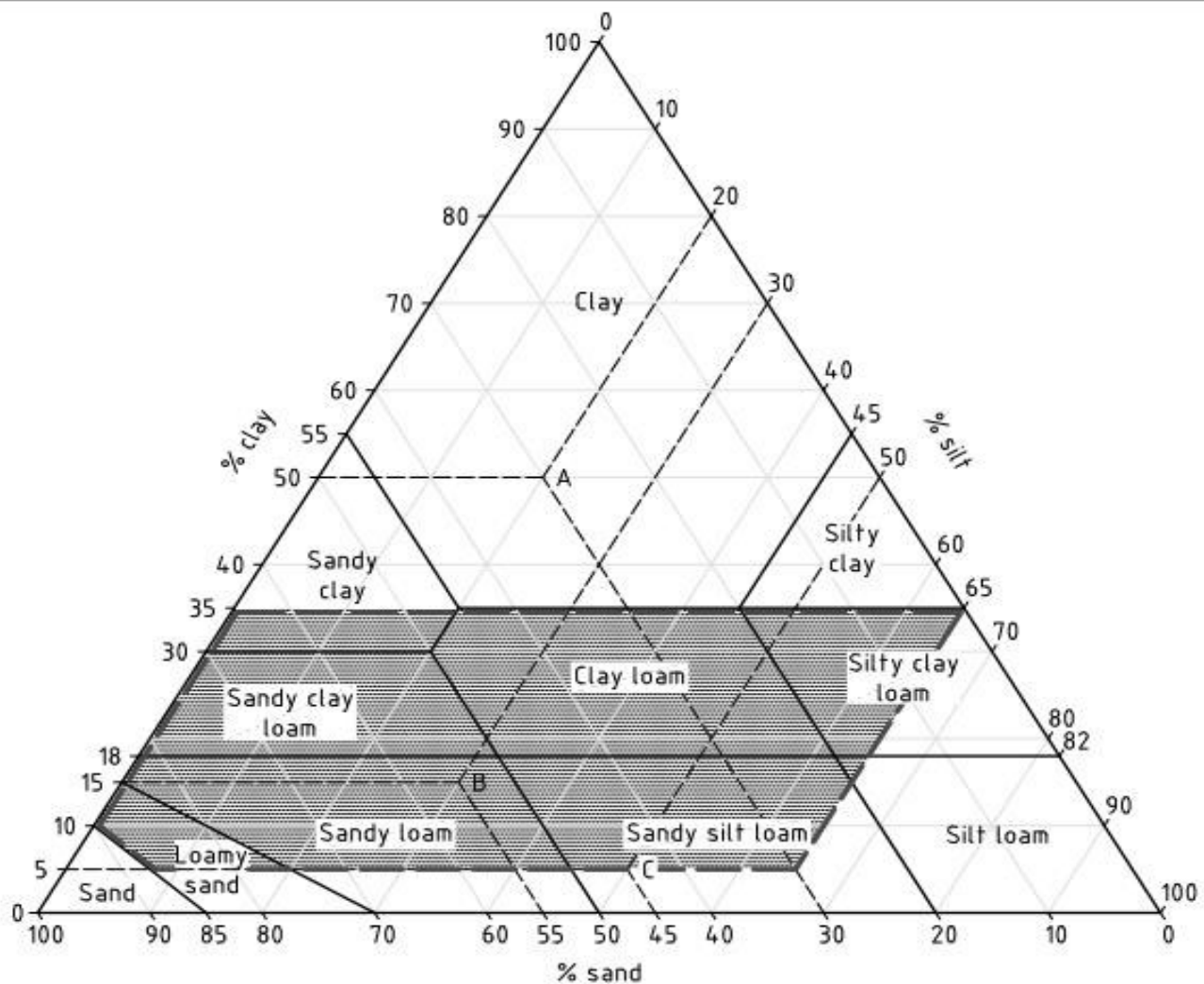
Client: Huperade Ltd	Chemtest Job No.:				21-00412	21-00412	21-00412
Quotation No.:	Chemtest Sample ID.:				1122307	1122308	1122309
	Client Sample ID.:				1	2	3
	Sample Type:				SOIL	SOIL	SOIL
	Asbestos Lab:						COVENTRY
Determinand	Accred.	SOP	Units	LOD			
Total Of 16 PAH's	U	2700	mg/kg	2.0		[A] 18	
Total Phenols	U	2920	mg/kg	0.30		< 0.30	

Results - Topsoil Report

BS3882:2015

Chemtest Job No.: 21-00412
 Chemtest Sample ID.: 1122307
 Client Sample Ref.:
 Sample Location:
 Client Sample ID.: 1
 Top Depth (m):
 Bottom Depth (m):
 Date Sampled:
 Time Sampled:

Parameter	Units	Multipurpose Range	Result	Compliant with Multipurpose Range? (Y/N)	Compliant with Specific Purpose Range? (Y/N)		
Texture					Acid	Low F	Calc.
Clay content	%		13				
Silt content	%		19				
Sand content	%		68				
Soil texture class		See Attached Chart	Sandy Loam	YES			
Mass Loss on Ignition							
Clay 5-20%		3.0-20	4.5	YES	YES	YES	YES
Clay 20-35%		5.0-20					
Stone Content	% m/m						
>2mm		0-30	7.3	YES			
>20mm		0-10	< 0.020	YES			
>50mm		0	< 0.020	YES			
Soil pH value		5.5-8.5	[A] 7.9	YES	NO	YES	YES
Carbonate (Calcareous only)	%		< 0.10				NO
Electrical Conductivity	µS/cm	If >3300 do ESP	[A] 2100	YES			
Available Nutrient Content							
Nitrogen %		>0.15	0.20	YES	YES		YES
Extractable phosphorus	mg/l	16-140	36	YES	YES	NO	YES
Extractable potassium	mg/l	121-1500	220	YES	YES		YES
Extractable magnesium	mg/l	51-600	95	YES	YES		YES
Carbon : Nitrogen Ratio		<20:1	13.2/1	YES	YES	YES	YES
Exchangeable sodium	%	<15	3.3				
Available Calcium	mg/l		2300				
Available Sodium	mg/l		100				
Phytotoxic Contaminants (by soil pH)		< 6.0	6.0-7.0	> 7.0			
Zinc (Nitric Acid extract)	mg/kg	<200	<200	<300	92	YES	
Copper (Nitric Acid extract)	mg/kg	<100	<135	<200	44	YES	
Nickel (Nitric Acid extract)	mg/kg	<60	<75	<110	13	YES	
Visible Contaminants	% mm						
>2mm		<0.5	0.000	YES			
..... of which plastics		<0.25	0.000	YES			
..... man-made sharps		zero in 1kg	0.000	YES			

Texture Classification Chart**Key**

Area within which the texture of topsoil is required to fall

NOTE Examples of textural classification are as follows.

- Soil A with 30% sand, 20% silt and 50% clay is in the "clay" textural class.
- Soil B with 55% sand, 30% silt and 15% clay is in the "sandy loam" textural class.
- Soil C with 45% sand, 50% silt and 5% clay is in the "sandy silt loam" textural class.

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British Standards can be obtained in PDF or hard copy formats from the BSI online shop: www.bsigroup.com/Shop or by contacting BSI Customer Services for hardcopies only: Tel: +44 (0)20 8996 9001, Email: cservices@bsigroup.com.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1122307		1			A	Plastic Bag
1122308		2			A	Amber Glass 250ml
1122308		2			A	Miscellaneous

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2020	Electrical Conductivity	Electrical conductivity (EC) of aqueous extract or calcium sulphate solution for topsoil	Measurement of the electrical resistance of a 2:1 water/soil extract.
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2115	Total Nitrogen in Soils	Nitrogen	Determination by elemental analyser
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2260	Carbonate	Carbonate	Titration
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2400	Cations	Cations	ICP-MS
2420	Phosphate	Phosphate	Spectrophotometry - Discrete analyser
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2620	LOI 440	LOI 440 Trommel Fines	Determination of the proportion by mass that is lost from a soil by ignition at 440°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Mark Bennett
MB Soils & Groundworks Limited
46-52 Richmond Hill
Wigan
WN5 8AA

14th September 2020
Our Ref: TOHA/20/9639/SS
Your Ref: see below.

Dear Sirs

Topsoil Analysis Report: Victoria Park, Warrington

We have completed the analysis of the soil sample recently submitted, referenced *Victoria Park Topsoil*, and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for general landscape purposes (trees, shrubs, amenity grass). In addition, the sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil - Table 1, Multipurpose Topsoil*).

This report presents the results of analysis for the sample submitted to our office, and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by third parties as a means of verification testing, validation testing or waste designation purposes.

SAMPLE EXAMINATION

The sample was described as a very dark brown (Munsell Colour 10YR 3/2), slightly moist, friable, non-calcareous SANDY LOAM with a moderately developed, very fine to medium granular and sub-angular blocky structure*. The sample was virtually stone free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

Tim O'Hare Associates LLP
Howbery Park Wallingford Oxfordshire OX10 8BA
T:01491 822653 E:info@toha.co.uk
www.toha.co.uk

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- particle size analysis (sand, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn);
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *sandy loam* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

The sample was virtually stone-free and as such, stones should not restrict the use of the soil for general landscape purposes.

pH and Electrical Conductivity Values

The sample was slightly acid in reaction (pH 6.2), with a pH value that would be considered ideal for general landscape purposes.

The electrical conductivity (salinity) value (water extract) was low, which indicates that soluble salts should not be present at levels that would be harmful to plants.

The electrical conductivity value by CaSO₄ extract (*BS3882* requirement) fell below the maximum specified value (3300 µS/cm) given in *BS3882:2015 – Table 1*.

Organic Matter and Fertility Status

The sample was adequately supplied with organic matter, total nitrogen and extractable phosphorus, but was deficient in extractable potassium and extractable magnesium. These deficiencies can be remedied by an appropriate fertiliser application.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to *BS3882:2015 - Table 1*: Notes 3 and 4, there is a recommendation to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with home-grown produce* land use in the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels* (C4SLs) for *Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

Of the potential contaminants determined, none exceeded their respective guideline values for *residential with home-grown produce* land use. The result for total lead (130 mg/kg) exceeds the DEFRA C4SL value for *allotment* end use (80 mg/kg). Confirmation should be sought from an environmental consultant, or the Local Authority Contaminated Land Officer, on the acceptability of the soil prior to its use if there is any doubt.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS3882:2015 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil - Table 1, Multipurpose Topsoil*).

From the soil examination and subsequent laboratory analysis, the sample was described as a slightly acid, non-saline, non-calcareous sandy loam with a moderately developed structure and very low stone content. The sample was adequately supplied with organic matter, total nitrogen and extractable phosphorus, but was deficient in extractable potassium and extractable magnesium. Of the potential contaminants determined, none exceeded their respective guideline values for *residential with home-grown produce* land use.

Based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes (trees, shrubs, amenity grass), provided the deficiencies in extractable potassium and extractable magnesium are remedied by an appropriate application of fertiliser and the soil's physical condition is satisfactory.

The sample was largely compliant with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil*) with the exception of the deficiencies in extractable potassium and extractable magnesium. On this occasion, these non-compliances would be considered minor provided they are addressed by an appropriate fertiliser application prior to planting, seeding or turfing.

RECOMMENDATIONS

Fertiliser for Planting

To address the nutrient deficiencies and to help promote effective plant establishment, we recommend applying and incorporating the compound, controlled release fertiliser *ICL Osmocote PrePlant* (17%N:9%P₂O₅:10%K₂O:2%MgO+TE) at a rate of 70 g/m² for planting beds and/or 180 g/tree pit, and to a depth of 200mm.

Fertiliser for Amenity Grass Establishment

To address the nutrient deficiencies and to help promote effective grass establishment, we recommend applying and incorporating the pre-seeding grass fertiliser *ICL Sportsmaster Pre-seeder* (8%N:12%P₂O₅:8%K₂O+3%MgO) prior to seeding or turfing at a rate of 35 g/m² and to a depth of 100mm.

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, resspreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

Further details on soil handling are provided in Annex A of *BS3882:2015*.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



Aaron Cross
BSc MSc
Soil Scientist



Ceri Spears
BSc MSc MSoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	MB Soils & Groundworks Ltd
Project:	Victoria Park, Warrington
Job:	Topsoil Analysis - BS3882:2015
Date:	14/09/2020
Job Ref No:	TOHA/20/9639/SS

Sample Reference		
		Accreditation
Clay (<0.002mm)	%	UKAS
Silt (0.002-0.063mm)	%	UKAS
Sand (0.063-2.0mm)	%	UKAS
Texture Class (UK Classification)	--	UKAS
Stones (2-20mm)	% DW	GLP
Stones (20-50mm)	% DW	GLP
Stones (>50mm)	% DW	GLP

Victoria Park Topsoil
13
15
72
SL
1
0
0

pH Value (1:2.5 water extract)	units	UKAS
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS
Electrical Conductivity (1:2 CaSO ₄ extract)	uS/cm	UKAS
Exchangeable Sodium Percentage	%	UKAS
Organic Matter (LOI)	%	UKAS
Total Nitrogen (Dumas)	%	UKAS
C : N Ratio	ratio	UKAS
Extractable Phosphorus	mg/l	UKAS
Extractable Potassium	mg/l	UKAS
Extractable Magnesium	mg/l	UKAS

6.2
101
2021
1.0
6.9
0.32
13
27
91
45

Total Arsenic (As)	mg/kg	MCERTS
Total Cadmium (Cd)	mg/kg	MCERTS
Total Chromium (Cr)	mg/kg	MCERTS
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS
Total Copper (Cu)	mg/kg	MCERTS
Total Lead (Pb)	mg/kg	MCERTS
Total Mercury (Hg)	mg/kg	MCERTS
Total Nickel (Ni)	mg/kg	MCERTS
Total Selenium (Se)	mg/kg	MCERTS
Total Zinc (Zn)	mg/kg	MCERTS
Water Soluble Boron (B)	mg/kg	MCERTS
Total Cyanide (CN)	mg/kg	MCERTS
Total (mono) Phenols	mg/kg	MCERTS

14
0.3
17
< 4.0
40
130
0.6
18
< 1.0
110
0.5
< 1
< 1.0

Naphthalene	mg/kg	MCERTS
Acenaphthylene	mg/kg	MCERTS
Acenaphthene	mg/kg	MCERTS
Fluorene	mg/kg	MCERTS
Phenanthrene	mg/kg	MCERTS
Anthracene	mg/kg	MCERTS
Fluoranthene	mg/kg	MCERTS
Pyrene	mg/kg	MCERTS
Benz(a)anthracene	mg/kg	MCERTS
Chrysene	mg/kg	MCERTS
Benzo(b)fluoranthene	mg/kg	MCERTS
Benzo(k)fluoranthene	mg/kg	MCERTS
Benzo(a)pyrene	mg/kg	MCERTS
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS
Dibenzo(a,h)anthracene	mg/kg	MCERTS
Benzo(g,h,i)perylene	mg/kg	MCERTS
Total PAHs (sum USEPA16)	mg/kg	MCERTS

< 0.05
< 0.05
< 0.05
< 0.05
2.00
0.37
3.90
3.80
2.10
1.80
2.20
1.20
2.50
0.96
< 0.05
1.00
21.7

Aliphatic TPH >C5 - C6	mg/kg	MCERTS
Aliphatic TPH >C6 - C8	mg/kg	MCERTS
Aliphatic TPH >C8 - C10	mg/kg	MCERTS
Aliphatic TPH >C10 - C12	mg/kg	MCERTS
Aliphatic TPH >C12 - C16	mg/kg	MCERTS
Aliphatic TPH >C16 - C21	mg/kg	MCERTS
Aliphatic TPH >C21 - C35	mg/kg	MCERTS
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS
Aromatic TPH >C5 - C7	mg/kg	MCERTS
Aromatic TPH >C7 - C8	mg/kg	MCERTS
Aromatic TPH >C8 - C10	mg/kg	MCERTS
Aromatic TPH >C10 - C12	mg/kg	MCERTS
Aromatic TPH >C12 - C16	mg/kg	MCERTS
Aromatic TPH >C16 - C21	mg/kg	MCERTS
Aromatic TPH >C21 - C35	mg/kg	MCERTS
Aromatic TPH (C5 - C35)	mg/kg	MCERTS

< 0.001
< 0.001
< 0.001
4.4
5.5
< 8.0
14
27
< 0.001
< 0.001
< 0.001
< 1.0
13
19
44
76

Benzene	mg/kg	MCERTS
Toluene	mg/kg	MCERTS
Ethylbenzene	mg/kg	MCERTS
p & m-xylene	mg/kg	MCERTS
o-xylene	mg/kg	MCERTS
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS

< 0.001
< 0.001
< 0.001
< 0.001
< 0.001
< 0.001

Asbestos	--	ISO 17025
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Not-detected

SL = SANDY LOAM

Visual Examination

The sample was described as a very dark brown (Munsell Colour 10YR 3/2), slightly moist, friable, non-calcaerous SANDY LOAM with a moderately developed, very fine to medium granular and sub-angular blocky structure. The sample was virtually stone free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Aaron Cross

Aaron Cross
BSc MSc
Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

The contents of this certificate shall not be reproduced without the express written permission of Tim O'Hare Associates LLP.



GROUNDTECH TESTING RESULTS

Groundtech Consulting Limited

PO Box 499

Manchester

M28 8EE

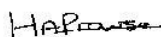


Attention :	Bradley Massey
Date :	29th March, 2021
Your reference :	18042
Our reference :	Test Report 21/4335 Batch 1
Location :	Avro Mill
Date samples received :	25th March, 2021
Status :	Final report
Issue :	1

Ten samples were received for analysis on 25th March, 2021 of which nine were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Hayley Prowse

Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Groundtech Consulting Limited
Reference: 18042
Location: Avro Mill
Contact: Bradley Massey
EMT Job No: 21/4335

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-2	3	4	6	7	8-9	10	11-12	13		Please see attached notes for all abbreviations and acronyms		
Sample ID	PLOT 1	PLOT 1	PLOT 2	PLOT 3	PLOT 3	PLOT 4	PLOT 4	PLOT 5	PLOT 5				
Depth	0.10	0.65	0.15	0.30	0.60	0.20	0.55	0.25	0.40				
COC No / misc													
Containers	V J	J	J	J	J	V J	J	V J	J				
Sample Date	23/03/2021	23/03/2021	23/03/2021	23/03/2021	23/03/2021	23/03/2021	23/03/2021	23/03/2021	23/03/2021				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021		LOD/LOR	Units	Method No.
Arsenic #	3.8	1.5	3.9	3.3	0.7	3.4	1.3	4.2	1.2		<0.5	mg/kg	TM30/PM15
Cadmium #	0.1	<0.1	0.1	0.1	<0.1	0.1	<0.1	0.2	<0.1		<0.1	mg/kg	TM30/PM15
Chromium #	41.1	34.7	45.4	35.1	25.2	35.9	23.8	24.7	26.0		<0.5	mg/kg	TM30/PM15
Copper #	13	6	15	14	2	13	4	18	5		<1	mg/kg	TM30/PM15
Lead #	18	29	17	17	<5	165	6	18	6		<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	mg/kg	TM30/PM15
Nickel #	10.2	6.2	11.1	10.1	2.7	11.0	3.2	35.6	4.2		<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1	<1	<1	<1	<1		<1	mg/kg	TM30/PM15
Zinc #	44	21	45	49	6	44	14	55	15		<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.28	<0.03	0.09	0.10	<0.03	0.06	0.16	0.09	<0.03		<0.03	mg/kg	TM4/PM8
Anthracene #	0.06	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.50	<0.03	0.18	0.26	<0.03	0.11	0.14	0.17	<0.03		<0.03	mg/kg	TM4/PM8
Pyrene #	0.42	<0.03	0.15	0.22	<0.03	0.10	0.10	0.13	<0.03		<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.30	<0.06	0.11	0.20	<0.06	<0.06	0.08	0.10	<0.06		<0.06	mg/kg	TM4/PM8
Chrysene #	0.24	<0.02	0.10	0.18	<0.02	0.06	0.06	0.10	<0.02		<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.44	<0.07	0.16	0.30	<0.07	0.10	<0.07	0.15	<0.07		<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.18	<0.04	0.06	0.13	<0.04	<0.04	<0.04	0.06	<0.04		<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.14	<0.04	0.05	0.08	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.14	<0.04	0.05	0.08	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
PAH 16 Total	2.7	<0.6	1.0	1.6	<0.6	<0.6	<0.6	0.8	<0.6		<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.32	<0.05	0.12	0.22	<0.05	0.07	<0.05	0.11	<0.05		<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.12	<0.02	0.04	0.08	<0.02	0.03	<0.02	0.04	<0.02		<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	99	106	97	100	99	95	99	93	100		<0	%	TM4/PM8
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	-	-	-	-	<0.1	-	<0.1	-		<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	-	-	-	-	<0.1	-	<0.1	-		<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	-	-	-	-	<0.1	-	<0.1	-		<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	-	-	-	-	<0.2	-	<0.2 ^{SV}	-		<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	<4	-	-	-	-	<4	-	<4 ^{SV}	-		<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	<7	-	-	-	-	<7	-	<7 ^{SV}	-		<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	21	-	-	-	-	23	-	19 ^{SV}	-		<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	21	-	-	-	-	23	-	19	-		<19	mg/kg	TM5/PM8/PM16/PM12/PM15

Element Materials Technology

Client Name: Groundtech Consulting Limited
Reference: 18042
Location: Avro Mill
Contact: Bradley Massey
EMT Job No: 21/4335

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-2	3	4	6	7	8-9	10	11-12	13		Please see attached notes for all abbreviations and acronyms		
Sample ID	PLOT 1	PLOT 1	PLOT 2	PLOT 3	PLOT 3	PLOT 4	PLOT 4	PLOT 5	PLOT 5				
Depth	0.10	0.65	0.15	0.30	0.60	0.20	0.55	0.25	0.40				
COC No / misc													
Containers	V J	J	J	J	J	V J	J	V J	J				
Sample Date	23/03/2021	23/03/2021	23/03/2021	23/03/2021	23/03/2021	23/03/2021	23/03/2021	23/03/2021	23/03/2021				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021	25/03/2021		LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	-	-	-	-	<0.1	-	<0.1	-		<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	-	-	-	-	<0.1	-	<0.1	-		<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	-	-	-	-	<0.1	-	<0.1	-		<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	-	-	-	-	<0.2	-	<0.2 ^{SV}	-		<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	<4	-	-	-	-	<4	-	<4 ^{SV}	-		<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	<7	-	-	-	-	15	-	12 ^{SV}	-		<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	77	-	-	-	-	111	-	101 ^{SV}	-		<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH+HS_CU_1D_AR) #	77	-	-	-	-	126	-	113	-		<19	mg/kg	TM5/PM8/PM16/PM19
Total aliphatics and aromatics(C5-35) (EH+HS_CU_1D_Total)	98	-	-	-	-	149	-	132	-		<38	mg/kg	TM5/PM8/PM16/PM19
MTBE #	<5	-	-	-	-	<5	-	<5	-		<5	ug/kg	TM36/PM12
Benzene #	<5	-	-	-	-	<5	-	<5	-		<5	ug/kg	TM36/PM12
Toluene #	<5	-	-	-	-	<5	-	<5	-		<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	-	-	-	-	<5	-	<5	-		<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	-	-	-	-	<5	-	<5	-		<5	ug/kg	TM36/PM12
o-Xylene #	<5	-	-	-	-	<5	-	<5	-		<5	ug/kg	TM36/PM12
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15		<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	28.5	7.7	26.2	31.2	8.7	26.5	13.8	28.4	8.4		<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.1185	0.0461	0.1140	0.1180	0.0080	0.0976	0.0420	0.1452	0.0216		<0.0015	g/l	TM38/PM20
Total Cyanide #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	mg/kg	TM89/PM45
Organic Matter	6.7	1.3	5.4	5.4	0.3	5.9	1.2	5.4	1.0		<0.2	%	TM21/PM24
pH #	7.96	8.34	8.00	7.88	8.59	8.17	8.76	8.31	8.69		<0.01	pH units	TM73/PM11

Matrix : Solid

Location: Avro Mill

Contact: Bradley Massey

[illegible]

Client Name: Groundtech Consulting Limited
Reference: 18042
Location: Avro Mill
Contact: Bradley Massey

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/4335	1	PLOT 1	0.10	2	25/03/2021	General Description (Bulk Analysis)	soil.stones
					25/03/2021	Asbestos Fibres	NAD
					25/03/2021	Asbestos ACM	NAD
					25/03/2021	Asbestos Type	NAD
					25/03/2021	Asbestos Level Screen	NAD
21/4335	1	PLOT 1	0.65	3	25/03/2021	General Description (Bulk Analysis)	Soil/Stones
					25/03/2021	Asbestos Fibres	NAD
					25/03/2021	Asbestos ACM	NAD
					25/03/2021	Asbestos Type	NAD
					25/03/2021	Asbestos Level Screen	NAD
21/4335	1	PLOT 2	0.15	4	25/03/2021	General Description (Bulk Analysis)	soil.stones
					25/03/2021	Asbestos Fibres	NAD
					25/03/2021	Asbestos ACM	NAD
					25/03/2021	Asbestos Type	NAD
					25/03/2021	Asbestos Level Screen	NAD
21/4335	1	PLOT 3	0.30	6	25/03/2021	General Description (Bulk Analysis)	soil.stones
					25/03/2021	Asbestos Fibres	NAD
					25/03/2021	Asbestos ACM	NAD
					25/03/2021	Asbestos Type	NAD
					25/03/2021	Asbestos Level Screen	NAD
21/4335	1	PLOT 3	0.60	7	25/03/2021	General Description (Bulk Analysis)	Soil/Stones
					25/03/2021	Asbestos Fibres	NAD
					25/03/2021	Asbestos ACM	NAD
					25/03/2021	Asbestos Type	NAD
					25/03/2021	Asbestos Level Screen	NAD
21/4335	1	PLOT 4	0.20	9	25/03/2021	General Description (Bulk Analysis)	Soil/Stones
					25/03/2021	Asbestos Fibres	NAD
					25/03/2021	Asbestos ACM	NAD
					25/03/2021	Asbestos Type	NAD
					25/03/2021	Asbestos Level Screen	NAD
21/4335	1	PLOT 4	0.55	10	25/03/2021	General Description (Bulk Analysis)	Soil/Stones
					25/03/2021	Asbestos Fibres	NAD
					25/03/2021	Asbestos ACM	NAD

Client Name: Groundtech Consulting Limited
Reference: 18042
Location: Avro Mill
Contact: Bradley Massey

[illegible]

Client Name: Groundtech Consulting Limited

Reference: 18042

Location: Avro Mill

Contact: Bradley Massey

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/4335

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample

OC	Outside Calibration Range
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HWOL ACRONYMS AND OPERATORS USED

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	EU_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.

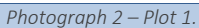
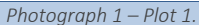
EMT Job No: 21/4335

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes

EMT Job No: 21/4335

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes

COVER SYSTEM PHOTOGRAPHS





Photograph 3 – Plot 1.



Photograph 4 – Plot 2.



Photograph 5 – Plot 2.



Photograph 6 – Plot 2.



Photograph 7 – Plot 3.



Photograph 8 – Plot 3.



Photograph 9 – Plot 3.



Photograph 10 – Plot 4.



Photograph 11 – Plot 4.



Photograph 12 – Plot 4.



Photograph 12 – Plot 5.



Photograph 12 – Plot 5.



Photograph 12 – Plot 5.

LIMITATIONS

Limitations

This contract was completed by Groundtech Consulting on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with due skill and care, taking into consideration the project brief provided, project objectives, agreed scope of works, prevailing site conditions and budget allocation.

Other than that defined in the paragraph above, Groundtech Consulting provides no other accountability or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted industry practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Groundtech Consulting. A third party who relies on this report, does so at their own and sole risk and no liability to such parties is provided by Groundtech Consulting.

It is the understanding of Groundtech Consulting that this report is to be used for the intended purpose as set out in the introduction. The purpose was instrumental in determining the scope and level of the services provided. Should the purpose of the report or the proposed end use of the site change, this report will no longer be directly applicable, and its validity readdressed. No reliance upon the report in the revised situation should be assumed by the client without the permission of Groundtech Consulting.

The report was written in 2021, later changes in legislation, statutory requirements and industry best practices have not been considered and this should be allowed for. Ground conditions can also change and should be investigated if there is any significant delay in acting on the findings of this report. The period of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions in this report should not be relied upon in the future without the written confirmation from Groundtech Consulting that it is safe to do so.

The observations and conclusions outlined in this report are based exclusively on the services that were provided as set out in the agreement between the client and Groundtech Consulting.

Groundtech Consulting are not liable for the existence of any condition, the discovery of which would require additional investigation outside the agreed scope of works or core competency. The services provided are based upon Groundtech Consulting observations of existing physical conditions at the site gained from site reconnaissance together with interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and Groundtech Consulting assume the information to be correct.

No responsibility can be accepted for errors for third party information presented in this report. Groundtech Consulting were not authorised to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Groundtech Consulting are not liable for any inaccurate information, misrepresentation of data or conclusions, which may inform the scope of investigation undertaken by Groundtech Consulting and forms the contract with the client.

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. Ground conditions can also be variable due to its heterogeneous properties and as investigation exploratory locations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report, particularly between exploratory holes. The extent of the limited area depends on the soil and groundwater conditions, together with other constraints such as the position of any existing structures and underground utilities. Geo-Environmental testing was carried out for a limited number of parameters [as stipulated in the contract] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The groundwater level often has not had time to reach equilibrium and a monitoring period is required. Furthermore, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawings provided in this report are not meant to be an accurate base plan, but are preliminary and used to present the general relative locations of features on, and surrounding, the site.

