GROUNDTECH
CONSULTING

18131/432

28 September 2018

Rhodes and Partners
The Lodge
Compstall Mills Estate
Compstall
Stockport
SK6 5HN

For the attention of George Levendi

Dear George

Re: Stockwell Mews, Stockwell Street

Further to your recent request, we have scheduled testing on the samples provided from the above site and carried out a Tier I GQRA upon receipt of the laboratory test results.

Site Works

Rhodes and partners visited the site on 22nd August 2018. Three trial pits (TP01 to TP03) were excavated across the area of interest to depths of between 1.0m and 1.50m bgl.

In total two samples were taken of the natural strata encountered within TP01 and TP02 on plots 2 and 3 respectively. Samples were taken at a depth of 1.0m bgl. Samples were not taken within the made ground as this is to be removed from site.

The approximate positions of the holes are shown on the Trial Pit Location Plan: 18131/01.

The Trial Pit Logs are presented in Appendix 1.

Ground Model

Made ground was encountered within TP01 and TP03.

The made ground generally consisted of tarmac overlying brick cobbles to a maximum depth of 0.20m bgl. In TP01 this was in turn underlain by compacted topsoil with fine tree roots to a maximum depth of 0.40m bgl.

The made ground was underlain by natural strata comprising of compacted dark brown sand or sandy gravels with occasional tree roots. Groundwater was not encountered within the trial pits.

Laboratory Testing

To inform the Tier I Generic Quantitative Risk Assessment, the following geo-environmental testing was scheduled to assess the risk from contamination on the site.

Determinand	Matrix	Number
Soil Suite - Arsenic, cadmium, chromium (Total and Hexavalent), copper, lead, mercury, nickel, selenium, zinc, pH, Speciated PAHs, soluble sulphate, organic matter and Asbestos.	Soil	2

The Geo-Environmental Laboratory Testing Results are presented in Appendix 2.

Samples of natural strata have been tested for a range of relevant determinands in accordance with CLR11 (DEFRA & EA, 2004), a Generic Quantitative Risk Assessment (GQRA) has been undertaken to determine the significance of the concentrations as derived through Geo-Environmental analysis.

The GQRA process comprises the comparison of the actual concentrations measured on site with Generic Assessment Criteria (GACs) for the protection of human health.

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The GACs used for the assessment of soil concentrations have been derived using the CLEA model. The GACs used and their ranking of importance are listed below:

- Soil Guideline Values (SGVs) which demonstrate minimal risk.
- LQM/CIEH S4ULs which use the same toxicological data as the SGVs but different exposure criteria.
- C4SLs which demonstrate low risk.

In deriving the GACs for use on Brownfield sites we have assumed a 1.0% Soil Organic Matter, unless the results indicate otherwise.

The proposed end-use for the site is residential therefore Residential with Plant Uptake Tier I Screening values have been adopted. The Tier I Screening Values are presented in Appendix 3.

Metals

All of the metals that were tested for had lower concentrations present than the residential screening values.

Determinand	Screening Value mg/Kg	TP01 Value mg/Kg	TP02 Value mg/Kg
Arsenic	32	4.1	5.7
Cadmium	10	0.1	0.6
Chromium (Total)	910	37.3	34.3
Chromium (VI)	21	<0.3	<0.3
Copper	2400	10	16
Lead	200	<5	22
Mercury	1	<0.1	<0.1
Nickel	130	35.7	55
Selenium	350	<1	2
Zinc	3700	39	81

Polycyclic Aromatic Hydrocarbons

In TP01 at 1.0m the concentration of dibenzo(ah)anthracene was slightly elevated above residential screening values with a concentration of 0.26 mg/Kg compared to the screening value limit of 0.24 mg/Kg.

Determinand	Screening Value mg/Kg	TP01 Value mg/Kg	TP02 Value mg/Kg
Acenaphthene	210	0.62	<0.05
Acenaphthylene	170	0.04	<0.03
Anthracene	2400	1.57	0.06
Benz(a)anthracene	7.2	2.42	0.13
Benzo(a)pyrene	2.2	1.99	0.09
Benzo(b)fluoranthene	2.6	2.56	0.11
Benzo(ghi)perylene	320	1.02	0.04
Benzo(k)fluoranthene	77	3.56	0.15
Chrysene	15	2.26	0.08
Dibenz(ah)anthracene	0.24	0.26	<0.04
Fluoranthene	280	7.14	0.21
Fluorene	170	0.57	<0.04
Indeno(123-cd)pyrene	27	1.24	0.05
Naphthalene	2.3	<0.04	<0.04
Phenanthrene	95	3.99	0.20
Pyrene	620	5.63	0.17

Asbestos

No Asbestos fibres were detected in the samples provided.

Conclusions

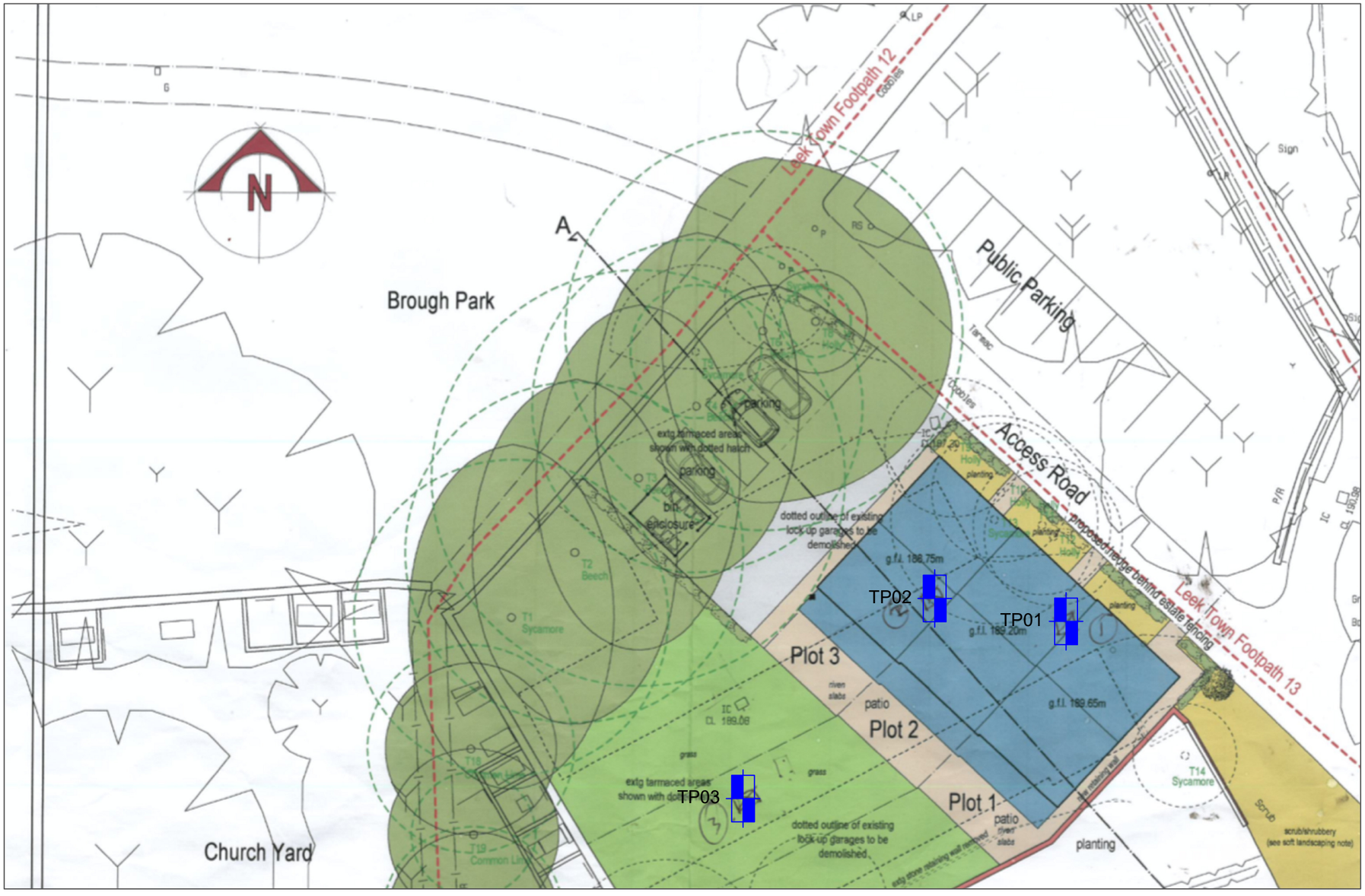
Geo-Environmental testing has identified elevated concentrations of Dibenz(ah)anthracene within the natural ground when compared to residential with plant uptake screening levels. The elevation is a slightly exceedance and BRE 465 calculates less than 100mm of cover is required to mitigate the risk. Therefore a nominal depth of topsoil to act as a growing medium will be sufficient to reduce the risk to an acceptable level.

We trust the above and enclosed meets with your current requirements however if you have any queries please do not hesitate to contact us.

Yours Sincerely
For Groundtech Consulting Limited

Callum Holden
Consulting Engineer
ch@groundtechconsulting.co

PLANS



NOTES

Approximate Trial Pit Locations

Rev	Details	Date

Status	
Preliminary	
Draft	●
Issued	
For Comment	
Approved	

GROUNDTECH CONSULTING

CLIENT

RHODES AND PARTNERS

PROJECT TITLE

FOXLOWE

DRAWING TITLE

TRIAL PIT LOCATION PLAN

DRAWN	CH	CHECKED	JD
DATE	October 2018	SCALE	NTS

DRAWING NUMBER

18131 01

APPENDIX 1
TRIAL PIT LOGS

Trial Pit Log

Trialpit No **TP1**

Sheet 1 of 1

Project Name: FOXLOWE	Project No. 18131	Co-ords: - Level:	Date
Location:		Dimensions (m): Depth 1.50	Scale 1:25
Client: RHODES AND PARTNERS			Logged PG

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20			MADE GROUND: Tarmac on brick cobbles
				0.40			MADE GROUND: Compact relic topsoil with some fine roots.
	1.00	ES					Dark brown compact sandy gravel with some to occasional roots.
				1.50			End of pit at 1.50 m

Remarks: 1. Sides stable. 2. No groundwater encountered.

Stability:

Trial Pit Log

Trialpit No **TP2**

Sheet 1 of 1

Project Name: FOXLOWE	Project No. 18131	Co-ords: - Level:	Date
Location:		Dimensions (m): Depth 1.00	Scale 1:25
Client: RHODES AND PARTNERS			Logged PG

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20			Dark brown compact sandy gravel with some to occasional roots.
				0.40			MADE GROUND: Compact relic topsoil with some fine roots.
							Dark brown compact sandy gravel with some to occasional roots.
							150mm diameter drain encountered - invert level 0.8m bgl.
	1.00	ES		1.00			End of pit at 1.00 m

Remarks: 1. Sides stable. 2. No groundwater encountered.

Stability:

Trial Pit Log

Trialpit No **TP3**

Sheet 1 of 1

Project Name: FOXLOWE	Project No. 18131	Co-ords: - Level:	Date
Location:		Dimensions (m): Depth 1.20	Scale 1:25
Client: RHODES AND PARTNERS			Logged PG

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			MADE GROUND: Tarmac on brick cobbles
							Dark brown compact SAND.
				1.20			End of pit at 1.20 m

Remarks: 1. Sides stable. 2. No groundwater encountered.

Stability:

APPENDIX 2
GEO-ENVIRONMENTAL TESTING RESULTS

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

Groundtech Consulting Limited
PO Box 499
Manchester
M28 8EE

Attention :	James Doyle
Date :	7th September, 2018
Your reference :	
Our reference :	Test Report 18/13798 Batch 1
Location :	
Date samples received :	30th August, 2018
Status :	Final report
Issue :	1

Two samples were received for analysis on 30th August, 2018 of which two 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.

Compiled By:

Bruce Leslie
Project Co-ordinator

Client Name: Groundtech Consulting Limited
Reference:
Location:
Contact: James Doyle
JE Job No.: 18/13798

Report : Solid

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

J E Sample No.	1	2									LOD/LOR	Units	Method No.
Sample ID	STOCKWELL LEEK 1	STOCKWELL LEEK 2											
Depth													
COC No / misc													
Containers	T	T											
Sample Date	22/08/2018 10:00	22/08/2018 10:05											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	30/08/2018	30/08/2018											
Arsenic #	4.1	5.7									<0.5	mg/kg	TM30/PM15
Cadmium #	0.1	0.6									<0.1	mg/kg	TM30/PM15
Chromium #	37.3	34.3									<0.5	mg/kg	TM30/PM15
Copper #	10	16									<1	mg/kg	TM30/PM15
Lead #	<5	22									<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1									<0.1	mg/kg	TM30/PM15
Nickel #	35.7	55.0									<0.7	mg/kg	TM30/PM15
Selenium #	<1	2									<1	mg/kg	TM30/PM15
Zinc #	39	81									<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.04	<0.03									<0.03	mg/kg	TM4/PM8
Acenaphthene #	0.62	<0.05									<0.05	mg/kg	TM4/PM8
Fluorene #	0.57	<0.04									<0.04	mg/kg	TM4/PM8
Phenanthrene #	3.99	0.20									<0.03	mg/kg	TM4/PM8
Anthracene #	1.57	0.06									<0.04	mg/kg	TM4/PM8
Fluoranthene #	7.14	0.21									<0.03	mg/kg	TM4/PM8
Pyrene #	5.63	0.17									<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	2.42	0.13									<0.06	mg/kg	TM4/PM8
Chrysene #	2.26	0.08									<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	3.56	0.15									<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	1.99	0.09									<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	1.24	0.05									<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.26	<0.04									<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	1.02	0.04									<0.04	mg/kg	TM4/PM8
PAH 16 Total	32.3	1.2									<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	2.56	0.11									<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	1.00	0.04									<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	96	90									<0	%	TM4/PM8
Natural Moisture Content	5.1	4.6									<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3									<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	<0.0015	0.0061									<0.0015	g/l	TM38/PM20
Organic Matter	0.2	0.6									<0.2	%	TM21/PM24
pH #	7.57	7.43									<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Groundtech Consulting Limited
Reference:
Location:
Contact: James Doyle

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 Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
18/13798	1	STOCKWELL LEEK 1		1	04/09/2018	**General Description (Bulk Analysis)**	soil-stones
					04/09/2018	**Asbestos Fibres**	NAD
					04/09/2018	**Asbestos ACM**	NAD
					04/09/2018	**Asbestos Type**	NAD
					04/09/2018	**Asbestos Level Screen**	NAD
18/13798	1	STOCKWELL LEEK 2		2	04/09/2018	**General Description (Bulk Analysis)**	soil-stones
					04/09/2018	**Asbestos Fibres**	NAD
					04/09/2018	**Asbestos ACM**	NAD
					04/09/2018	**Asbestos Type**	NAD
					04/09/2018	**Asbestos Level Screen**	NAD

Client Name: Groundtech Consulting Limited
Reference:
Location:
Contact: James Doyle

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 18/13798						

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

JE Job No.: 18/13798

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. 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.

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 overesitimate 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

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

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.

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.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental 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

JE Job No: 18/13798

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	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 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 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 8270 method for the solvent extraction and determination of 16 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
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
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	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
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	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 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+), 7196A (Hex Cr)	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.	PM42	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 and 9045D and BS1377:1990. 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

APPENDIX 3
TIER 1 SCREENING VALUES

Generic Tier I Generic Assessment Criteria (GAC)

GROUNDTECH CONSULTING

Proposed End Use	Unit	Residential with Plant Uptake			Commercial			Source
SOM	%	1	2.5	6	1	2.5	6	
Arsenic	mg/kg	32	32	32	640	640	640	SGVs
Beryllium	mg/kg	1.7	1.7	1.7	12	12	12	LQM S4ULs
Boron (water soluble)	mg/kg	290	290	290	240000	240000	240000	LQM S4ULs
Cadmium	mg/kg	10	10	10	230	230	230	SGVs
Chromium (Total)	mg/kg	910	910	910	8600	8600	8600	LQM S4ULs
Chromium (VI)	mg/kg	21	21	21	49	49	49	DEFRA C4SLs
Copper	mg/kg	2400	2400	2400	68000	68000	68000	LQM S4ULs
Lead	mg/kg	200	200	200	2300	2300	2300	DEFRA C4SLs
Mercury	mg/kg	1	1	1	26	26	26	SGVs
Nickel	mg/kg	130	130	130	1800	1800	1800	SGVs
Selenium	mg/kg	350	350	350	13000	13000	13000	SGVs
Vanadium	mg/kg	410	410	410	9000	9000	9000	LQM S4ULs
Zinc	mg/kg	3700	3700	3700	730000	730000	730000	LQM S4ULs
Aliphatic EC 5 - 6	mg/kg	42	78	160	3200 (304) [sol]	5900 (558) [sol]	12000 (1150) [sol]	LQM S4ULs
Aliphatic EC 6 - 8	mg/kg	100	230	530	7800 (144) [sol]	17000 (322) [sol]	40000 (736) [sol]	LQM S4ULs
Aliphatic EC 8 - 10	mg/kg	27	65	150	2000 (78) [sol]	4800 (190) [sol]	11000 (451) [vap]	LQM S4ULs
Aliphatic EC 10 - 12	mg/kg	130 (48) [vap]	330 (118) [vap]	760 (283) [vap]	9700 (48) [sol]	23000 (118) [vap]	47000 (283) [vap]	LQM S4ULs
Aliphatic EC 12 - 16	mg/kg	1100 (24) [sol]	2400 (59) [sol]	4300 (142) [sol]	59000 (24) [sol]	82000 (59) [sol]	90000 (142) [sol]	LQM S4ULs
Aliphatic EC 16 - 35	mg/kg	65000 (8.48) [f,sol]	92000 (21) [f,sol]	110000 [f]	1600000 [f]	1700000 [f]	1800000 [f]	LQM S4ULs
Aliphatic EC 35 - 44	mg/kg	65000 (8.48) [f,sol]	92000 (21) [f,sol]	110000 [f]	1600000 [f]	1700000 [f]	1800000 [f]	LQM S4ULs
Aromatic EC 5 - 7	mg/kg	70	140	300	26000 (1220) [sol]	46000 (2260) [sol]	86000 (4710) [sol]	LQM S4ULs
Aromatic EC 7 - 8	mg/kg	130	290	660	56000 (869) [vap]	110000 (1920)	180000 (4360)	LQM S4ULs
Aromatic EC 8 - 10	mg/kg	34	83	190	3500 (613) [vap]	8100 (1500) [vap]	17000 (3580) [vap]	LQM S4ULs
Aromatic EC 10 - 12	mg/kg	74	180	380	16000 (364) [sol]	28000 (899) [sol]	34000 (2150) [sol]	LQM S4ULs
Aromatic EC 12 -16	mg/kg	140	330	660	36000 (169) [sol]	37000	38000	LQM S4ULs
Aromatic EC 16 - 21	mg/kg	260 [f]	540 [f]	930 [f]	28000 [f]	28000 [f]	28000 [f]	LQM S4ULs
Aromatic EC 21 - 35	mg/kg	1100 [f]	1500 [f]	1700 [f]	28000 [f]	28000 [f]	28000 [f]	LQM S4ULs
Aromatic EC 35 - 44	mg/kg	1100 [f]	1500 [f]	1700 [f]	28000 [f]	28000 [f]	28000 [f]	LQM S4ULs
Benzene	mg/kg	0.33	0.33	0.33	95	95	95	SGVs
Toluene	mg/kg	610	610	610	4400	4400	4400	SGVs
Ethyl Benzene	mg/kg	350	350	350	2800	2800	2800	SGVs
Xylene - o	mg/kg	250	250	250	2600	2600	2600	SGVs
Xylene - m	mg/kg	240	240	240	3500	3500	3500	SGVs
Xylene - p	mg/kg	230	230	230	3200	3200	3200	SGVs
MTBE (methyl tert-butyl	mg/kg	49	84	160	7900	13000	24000	CL:AIRE 2010
Acenaphthene	mg/kg	210	510	1100	84000 (57) [sol]	97000 (141) [sol]	100000	LQM SAULs
Acenaphthylene	mg/kg	170	420	920	83000 (86.1) [sol]	97000 (212) [sol]	100000	LQM S4ULs
Anthracene	mg/kg	2400	5400	11000	520000	540000	540000	LQM S4ULs
Benz(a)anthracene	mg/kg	7.2	11	13	170	170	180	LQM S4ULs
Benzo(a)pyrene	mg/kg	2.2	2.7	5*	35	35	77*	DEFRA C4SL*/LQM
Benzo(b)fluoranthene	mg/kg	2.6	3.3	3.7	44	44	45	LQM S4ULs
Benzo(ghi)perylene	mg/kg	320	340	350	3900	4000	4000	LQM S4ULs
Benzo(k)fluoranthene	mg/kg	77	93	100	1200	1200	1200	LQM S4ULs
Chrysene	mg/kg	15	22	27	350	350	350	LQM S4ULs
Dibenz(ah)anthracene	mg/kg	0.24	0.28	0.3	3.5	3.6	3.6	LQM S4ULs
Fluoranthene	mg/kg	280	560	890	23000	23000	23000	LQM S4ULs
Fluorene	mg/kg	170	400	860	63000 (30.9) [sol]	68000	71000	LQM S4ULs
Indeno(123-cd)pyrene	mg/kg	27	36	41	500	510	510	LQM S4ULs
Naphthalene	mg/kg	2.3 f	5.6 f	13 f	190 [f] (76.4) [sol]	460 [f] (183) [sol]	1100 [f] (432) [sol]	LQM S4ULs
Phenanthrene	mg/kg	95	220	440	22000	22000	23000	LQM S4ULs
Pyrene	mg/kg	620	1200	2000	54000	54000	54000	LQM S4ULs

Generic Tier I Generic Assessment Criteria (GAC)

GROUNDTECH CONSULTING

Proposed End Use	Unit	Residential with Plant Uptake			Commercial			Source
SOM	%	1	2.5	6	1	2.5	6	
Phenol	mg/kg	420	420	420	3200	3200	3200	SGVs
Chlorophenols	mg/kg	0.87 [g]	2	4.5	3500	4000	4300	LQM S4ULs
Pentachlorophenol	mg/kg	0.22	0.52	1.2	400	400	400	LQM S4ULs
Carbon disulphide	mg/kg	0.14	0.29	0.62	11	22	47	LQM S4ULs
Hexachlorobutadiene	mg/kg	0.29	0.7	1.6	31	66	120	LQM S4ULs
1,1,1,2 Tetrachloroethane	mg/kg	1.6	3.4	7.5	270	550	1100	LQM S4ULs
1,1,1 Trichloroethane	mg/kg	8.8	18	39	660	1300	3000	LQM S4ULs
Trichloroethene	mg/kg	0.016	0.034	0.075	1.2	2.6	5.7	LQM S4ULs
Tetrachoromethane	mg/kg	0.026	0.056	0.13	2.9	6.3	14	LQM S4ULs
1,2-Dichloroethane	mg/kg	0.0071	0.011	0.019	0.67	0.97	1.7	LQM S4ULs
Chloroethene (Vinyl	mg/kg	0.00064	0.00087	0.0014	0.059	0.077	0.12	LQM S4ULs
Trichloromethane	mg/kg	0.91	1.7	3.4	99	170	350	LQM S4ULs
Tetrachloroethene	mg/kg	0.18	0.39	0.9	19	42	95	LQM S4ULs
Hexachlorobenzene	mg/kg	1.8 (0.2) [vap]	3.3 (0.5) [vap]	4.9	110 (0.2) [vap]	120	120	LQM S4ULs
Pentachlorobenzene	mg/kg	5.8	12	22	640 (43) [sol]	770 (107) [sol]	830	LQM S4ULs
1,2,4,5-Tetrachlorobenzene	mg/kg	0.33	0.77	1.6	42 (19.7) [sol]	72 (49.1) [sol]	96	LQM S4ULs
1,2,3,5-Tetrachlorobenzene	mg/kg	0.66	1.69	3.7	49 (39.4) [vap]	120 (98.1) [vap]	240 (235) [vap]	LQM S4ULs
1,2,3,4-Tetrachlorobenzene	mg/kg	15	36	78	1700 (122) [vap]	3080 (304) [vap]	4400 (728) [vap]	LQM S4ULs
1,3,5-Trichlorobenzene	mg/kg	0.33	0.81	1.9	23	55	130	LQM S4ULs
1,2,4-Trichlorobenzene	mg/kg	2.6	6.4	15	220	530	1300	LQM S4ULs
1,2,3-Trichlorobenzene	mg/kg	1.5	3.6	8.6	102	250	590	LQM S4ULs
1,4-dichlorobenzene	mg/kg	61 [f]	150 [f]	350 [f]	4400 [f] (224) [vap]	10000 [f] (540) [vap]	25000 [f] (1280) [vap]	LQM S4ULs
1,3-dichlorobenzene	mg/kg	0.4	1	2.3	30	73	170	LQM S4ULs
1,2-Dichlorobenzene	mg/kg	23	55	130	2000 (571) [sol]	4800 (1370) [sol]	11000 (3240) [sol]	LQM S4ULs
Chlorobenzene	mg/kg	0.46	1	2.4	56	130	290	LQM S4ULs
Gamma-	mg/kg	0.06	0.14	0.33	67	69	70	LQM S4ULs
Beta-	mg/kg	0.085	0.2	0.46	65	65	65	LQM S4ULs
Alpaha -	mg/kg	0.23	0.55	1.2	170	180	180	LQM S4ULs
Beta -Endosulfan	mg/kg	7	17	39	6300 (0.00007)	7800 (0.0002) [vap]	8700	LQM S4ULs
Alpha-Endosulfan	mg/kg	7.4	18	41	5600 (0.003) [vap]	7400 (0.007) [vap]	8400 (0.016) [vap]	LQM S4ULs
Dichlorvos	mg/kg	0.032	0.066	0.14	140	140	140	LQM S4ULs
Atrazine	mg/kg	3.3	7.6	17.4	9300	9400	9400	LQM S4ULs
Dieldrin	mg/kg	0.97	2	3.5	170	170	170	LQM S4ULs
Aldrin	mg/kg	5.7	6.6	7.1	170	170	170	LQM S4ULs
HMX	mg/kg	5.7	13	26	110000	110000	110000	LQM S4ULs
2,4,6-Trinitrotoulene	mg/kg	1.6	3.7	8.1	1000	1000	1000	LQM S4ULs
RDX	mg/kg	120	250	540	210000	210000	210000	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 affects

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

[dir] S4ULs based on a threshold protecive direct skin contact with phenol (guideline in brackets based on health effects following long term exposure provided for illustation only

APPENDIX 4
LIMITATIONS

Standard 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 2018, 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.