

Topsoil Validation Record



Job number	R1742d	Depth ref:	R1742-R01-v3	Quality ref:	R1742-R01-v3	Other documents attached	✓						
Date	13.11.2020	Area use:	garden	landscaped	stockpile	other							
Site name / location	Camp Road, Upper Heyford, Bicester	Size area (m):	Irregular	Approx Area (m ²):	750	Approx Depth Top (m):	0.3	Approx Volume Top (m ³):	225	Approx Depth Sub (m):	n/a	Approx Volume Sub (m ³):	n/a
Plot:	Village Centre North public open space (POS) area in location of former Buildings 100-102.	Number depth entries required	1 (1 per 50m grid space). 3 provided.		Number samples required:	3 TS (1 per 250m ³ , minimum 3 samples per single source), 3 TS provided.							
Compiled by:	SM												

Quality Validation	Inspection date/time:	20.10.2020	Inspected by:	SM	Photographed:	✓
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Source Topsoil	1.	✓	Taylor Wimpey development site: Aspen Gardens, Stotfold, Bedfordshire.
Description Topsoil	2.	✓	Brown very sandy gravelly clay topsoil with frequent rootlets.
Sample Topsoil	3.	✓	3 in-situ soil samples collected from material placed in POS area (Lab ref: 20/14399) – sample locations indicated on attached drawing (ref: R1742d-D01).
Source Subsoil	4.	x	Not used
Description Subsoil	5.	x	N/A
Sample Subsoil	6.	x	N/A

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Topsoil Results Summary

Contaminant	Soil standard adopted (mg/kg)	Concentrations (mg/kg)	Compliant? / Exceedances?
Asbestos	NAD	NAD	Yes
Antimony	550	<1-2	Yes
Arsenic	32	13.1-16.1	Yes
Barium	1,300	77-90	Yes
Beryllium	51	0.9-1.1	Yes
Boron (water soluble)	291	1.2-2.4	Yes
Cadmium	10	0.2-0.3	Yes
Chromium (total)	3,000	37.5-53.8	Yes
Chromium VI	4.3	<0.3	Yes
Cobalt	240	6.6-7.1	Yes
Copper	300	15-22	Yes
Lead	200	31-85	Yes
Mercury	1	<0.1	Yes
Molybdenum	670	1.6-4.3	Yes
Nickel	130	15.6-17.8	Yes
Selenium	350	<1	Yes
Vanadium	75	43-52	Yes
Zinc	300	67-81	Yes
Naphthalene	1.5	<0.04-1.31	Yes
Acenaphthene	170	0.06-1.74	Yes
Acenaphthylene	210	0.13-0.77	Yes
Fluorene	160	0.15-1.25	Yes
Phenanthrene	92	1.41-16.43	Yes
Anthracene	2,300	0.47-5.40	Yes
Fluoranthene	260	2.02 - >26.20	Yes
Pyrene	560	1.40-18.96	Yes
Benzo(a)anthracene	3.1	0.91-12.98	No (POS-TS1)

Contaminant	Soil standard adopted (mg/kg)	Concentrations (mg/kg)	Compliant? / Exceedances?
Chrysene	6	1.20-14.49	No (POS-TS1)
Benzo(b) fluoranthene	5.6	1.1-18.32	No (POS-TS1)
Benzo(k) fluoranthene	8.5	0.43-7.12	Yes
Benzo(a) pyrene	0.83	0.72-12.57	No (POS-TS1)
Indeno(123cd) pyrene	3.2	0.56-9.18	No (POS-TS1)
Dibenzo(ah) anthracene	0.76	0.15-2.35	No (POS-TS1)
Benzo(ghi) perylene	44	0.51-8.60	Yes
Aliphatic C5-C6	30	<0.01	Yes
Aliphatic C6-C8	73	<0.01	Yes
Aliphatic C8-C10	19	<0.01	Yes
Aliphatic C10-C12	93	<0.02	Yes
Aliphatic C12-C16	740	<4	Yes
Aliphatic C16-C21	1,000	<7-13	Yes
Aliphatic C21-C35	1,000	<7-114	Yes
Aromatic C6-C7	0.08	<0.01	Yes
Aromatic C7-C8	120	<0.01	Yes
Aromatic C8-C10	27	<0.01	Yes
Aromatic C10-C12	69	<0.01	Yes
Aromatic C12-C16	140	<4-16	Yes
Aromatic C16-C21	250	<7-192	Yes
Aromatic C21-C35	890	<7-829	Yes
MTBE	49	<0.005	Yes
Benzene	0.08	<0.005	Yes
Toluene	120	<0.005	Yes
Ethylbenzene	65	<0.005	Yes
m/p-Xylene	42	<0.005	Yes
o-Xylene	45	<0.005	Yes

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Further Assessment of PAH Exceedances

As presented in the table above, several exceedances of the adopted screening criteria have been reported for sample 'POS-TS1' for a range of polycyclic aromatic hydrocarbons (PAHs) therefore further assessment has been deemed necessary to determine whether the material is suitable for its current use. No exceedances were reported within the two other samples collected from the POS area. The initial assessment has utilised screening criteria from Table B1 of the Waterman Remediation Strategy for the site (report ref: EED10658-109_S_12.2.3_FA; September 2012) which is intended for a residential land use scenario and assumes a 1% soil organic matter (SOM) content. The assessment criteria utilised is therefore considered to be overly conservative as it does not accurately reflect the site setting - an area of public open space situated in front of several commercial premises and a car parking area - or take into consideration the SOM content of the samples which had an average value of 3.13%.

To reflect the site setting more accurately the exceedances have been compared to screening criteria obtained from the more recently published LQM / CIEH Suitable 4 Use Levels (S4ULs; 2015) with reference to the 'POS 2' scenario defined as 'an area of open space provided for recreational use, usually owned and maintained by Local Authority'. The results are also compared to criteria specified for soils with a 2.5% SOM content, consistent with the reported SOM content of the soil. Comparison of the PAH exceedances to the revised screening criteria are summarised in the table below.

Determinant	Soil standard adopted - S4UL 'POS 2', 2.5% SOM (mg/kg)	Concentrations (mg/kg) – unless specified otherwise	Compliant?
SOM	n/a	3.13% (Ave.)	n/a
Benzo(a)anthracene	56	12.98	Yes
Chrysene	110	14.49	Yes
Benzo(b) fluoranthene	15	18.32	No
Benzo(a) pyrene	12	12.57	No
Indeno(123cd) pyrene	170	9.18	Yes
Dibenzo(ah)anthracene	1.3	2.35	No

Even with the revised screening criteria there were still minor exceedances reported for benzo(b)fluoranthene at 18.32 mg/kg (criteria = 15 mg/kg), benzo(a)pyrene at 12.57 mg/kg (criteria = 12 mg/kg) and dibenzo(ah)anthracene at 2.35 mg/kg (criteria = 1.3 mg/kg). Further assessment of the significance of the exceedances was therefore carried out (see the attached 'Screening Criteria Exceedance Significance' summary) which indicates that the soil is suitable for its intended use, but this is subject to approval by Local Authority as this is a deviation from the approved Remediation Strategy.

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Exceedances of the Waterman Remediation Strategy residential soil screening criteria (1% SOM assumed) were recorded in a single sample ('POS-TS1') for benzo(a)anthracene at 12.98 mg/kg (criteria = 3.1 mg/kg), chrysene at 14.49 mg/kg (criteria = 6 mg/kg), benzo(b)fluoranthene at 18.32 mg/kg (criteria = 5.6 mg/kg), benzo(a)pyrene at 12.57 mg/kg (criteria = 0.83 mg/kg), Indeno(123cd) pyrene at 9.18 mg/kg (criteria = 3.2 mg/kg) and dibenzo(ah)anthracene at 2.35 mg/kg (criteria = 0.76 mg/kg).

When comparing the PAH exceedances against criteria considered to be more suitable to the site setting and the SOM content of the soil (the LQM / CIEH S4ULs: 'POS 2', 2.5% SOM), minor exceedances were still reported for benzo(b)fluoranthene at 18.32 mg/kg (criteria = 15 mg/kg), benzo(a)pyrene at 12.57 mg/kg (criteria = 12 mg/kg) and dibenzo(ah)anthracene at 2.35 mg/kg (criteria = 1.3 mg/kg).




Both the initial and revised screening criteria are necessarily conservative assuming large safety factors for toxicological data and higher band estimates for exposure frequencies and durations, and uptake / availability of contaminants. While large or frequent exceedances likely indicate the need for Site-Specific Detailed Quantitative Risk Assessment or Remediation, where minor and infrequent expenses occur it is appropriate to assemble other lines of evidence to check the significance of the exceedances, especially where contaminants are common in the environment and remediation of the total mass of soil to very stringent Generic standards may exceed what would be considered reasonable practicable. The three lines of evidence considered are:

	Statistical Significance & Representativeness	Alternative assessment approaches	Availability and Accessibility
Commentary	PAH concentrations exceeding the S4UL 'POS 2' 2.5% SOM criteria were only detected within one of the three topsoil samples tested with the rest demonstrating concentrations significantly below the screening criteria. Given the results, it can be inferred that only a small proportion of relevant individual exposure events (swallowing bolus of soils for ingestion or smears of soil on skin for dermal contact would involve soils above the S4UL 'POS 2' 2.5% screening criteria. Also the managed vegetation cover of the POS area will reduce exposure to future site users to the underlying topsoil.	For PAHs an alternative approach to assessment of risks has been adopted by Public Health England ¹ where a surrogate PAH marker (usually benzo(a)pyrene in a mixture of PAHs consistent with a confirmed toxicological profile can be used to assess the likelihood of the total genotoxic PAH loading of the soils. The ratio of the PAHs demonstrating exceedances to benzo(a)pyrene in sample 'POS-TS1' are all within the upper and lower limits of the model soils and coal tar mixtures so the surrogate approach could be adopted. Furthermore, the approach uses a Low Level of Toxicological Concern (LLTC) derived for similar mixtures of PAHs in Coal Tar rather than an Index Dose for the individual compound, so the approach adopted in the Category 4 Screening levels (C4SL) to determine land which is definitely not contaminated may be more appropriate.	Although not universally accepted as a means of demonstrating sources of weathered or altered PAHs, PAH cross-plot ratios for various hydrocarbon sources indicate that the current mixture present in the soils does not appear to be of coal tar or other petrogenic origin and is more closely associated with pyrolytic processes (i.e. coal) which tend to yield less available PAHs. The PAHs are likely to be strongly adsorbed to or entrained in solid organic matter particles rather than dissolved in organic solvents such as oil or coal tar as was used in the animal models used to determine Health Criteria Values.
Outcome	The level of exposure assumed in deriving the screening criteria probably significantly overestimates the frequency that soils containing the more elevated PAH concentrations recorded would be ingested or dermally adsorbed as all of the other samples had substantially lower PAH concentrations.	The C4SL ('POS 2') value considering the LLTC for mixtures of PAHs and considering BaP as an indicative marker compound for all genotoxic PAH exposure is probably more appropriate: this threshold of 21 mg/kg <u>was not exceeded</u> .	Although bioavailability or inaccessibility testing has not been carried out on the soils, in general PAHs would be considered less likely to partition from pyrolytic sources widely dispersed in soil for uptake than the consistent petrogenic source that is assumed in the exposure models.

Overall, given the highly conservative nature of the screening criteria applied, the recorded magnitude and frequency of exceedances, the properties for the soil and wider context, the exceedances recorded are not considered likely to indicate any significant risk to human health and further assessment or remedial measures are not recommended. See limitations.

¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/671075/Contaminated_land_information_sheet_PAHs.pdf

Topsoil Validation Record

Depth Validation	Inspection date/time:	20.10.20	Inspected by:	SM	Photographed:	✓
Trial Pit 1 (west)	Required Depth (mm)	300	Measured Depth (mm)	300	PASS	
Source Topsoil	Taylor Wimpey development site: Aspen Gardens, Stotfold, Bedfordshire					
Source Subsoil	N/A					
Soil profile/description	0.00-0.30m.	Brown very sandy gravelly clay topsoil with frequent rootlets.				
	0.30m	Base				
<p>Photograph (location)</p> 		<p>Photograph (depth profile)</p> 		<p>Photograph (soil type)</p> 		

Topsoil Validation Record

Depth Validation	Inspection date/time:	20.10.20	Inspected by:	SM	Photographed:	✓
Trial Pit 2 (centre)	Required Depth (mm)	300	Measured Depth (mm)	330	PASS	
Source Topsoil	Taylor Wimpey development site: Aspen Gardens, Stotfold, Bedfordshire					
Source Subsoil	N/A					
Soil profile/description	0.00-0.33m.	Brown very sandy gravelly clay topsoil with frequent rootlets.				
	0.33m	Base				

Photograph (location)



Photograph (depth profile)



Photograph (soil type)



Topsoil Validation Record

Depth Validation	Inspection date/time:	20.10.20	Inspected by:	SM	Photographed:	✓
Trial Pit 3 (east)	Required Depth (mm)	300	Measured Depth (mm)	340	PASS	
Source Topsoil	Taylor Wimpey development site: Aspen Gardens, Stotfold, Bedfordshire					
Source Subsoil	N/A					
Soil profile/description	0.00-0.34m.	Brown very sandy gravelly clay topsoil with frequent rootlets.				
	0.34m	Base				

Photograph (location)



Photograph (depth profile)



Photograph (soil type)





Topsoil Validation Record



Exceedances have been observed for several PAHs within one of the three sample collected from the imported topsoil. Assessment of the significance of these has been provided which has determined that the soil is suitable for its intended purpose, however this is subject to approval by the Local Planning Authority.

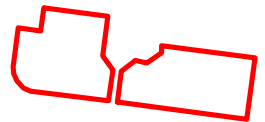
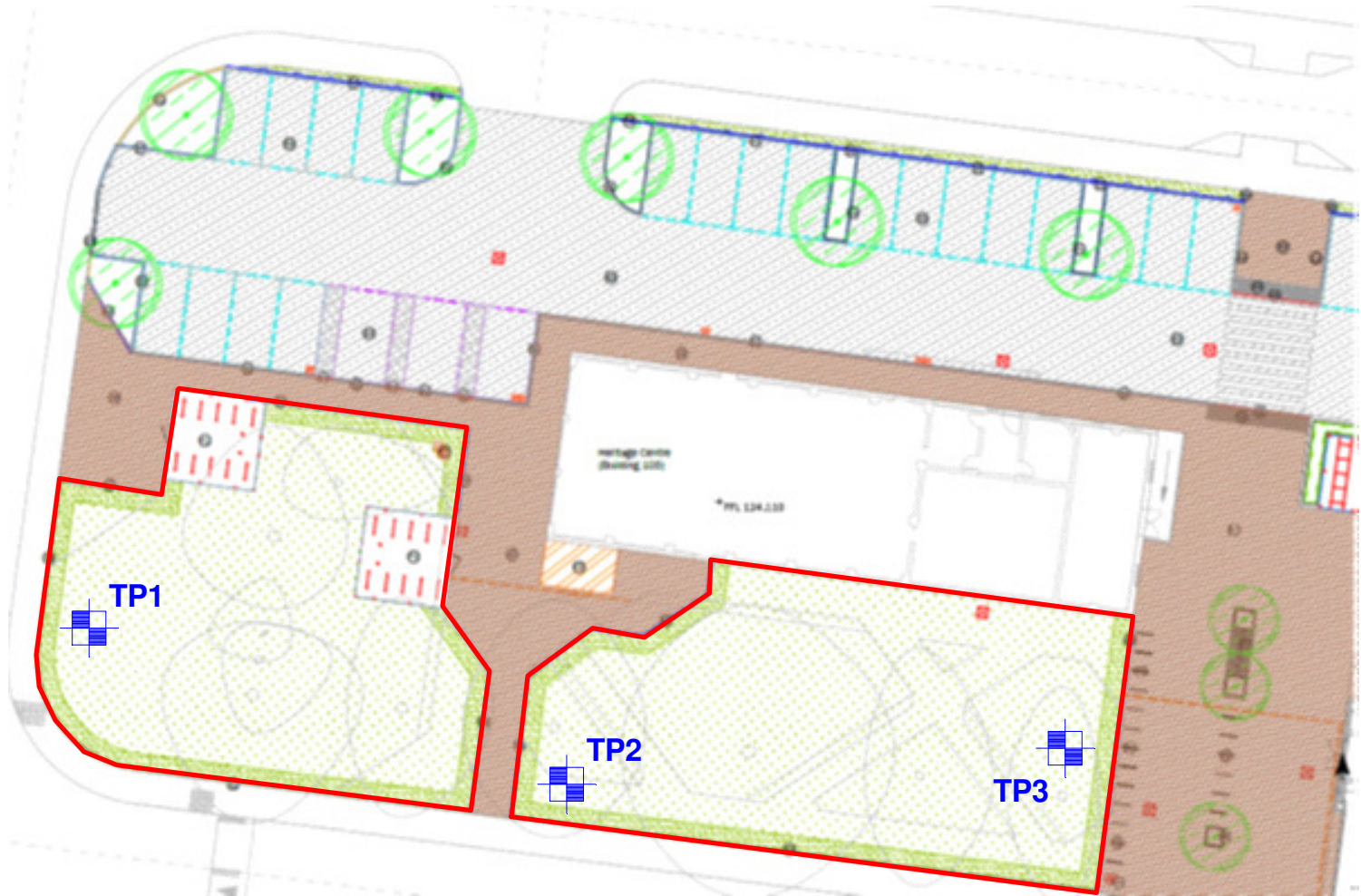
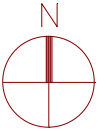
These plots have PASSED testing for depth.

No additional inspections are required for these plots.

SGP Staff:	S D Miller BSc MCIWEM	Signed:		17.11.20
SGP Staff:	D Wayland BSc MSc AssocCIWM MCIWEM C.WEM	Signed:		17.11.20

Guide notes:

1.	Source Topsoil	As much information as possible: Date Delivered, volume/weight delivery, supplier, certification, source address (yard), original source address (site).
2.	Description Topsoil	Full Description: Grading (Particle Size: clay, silt, sand, gravel), organic content, colour, odour, minerals, stone, glass, slate, ash, clinker, coal, coke, tarmac, plastic, other?
3.	Sample Topsoil	Date sampled, date submitted, sample reference, laboratory, laboratory job number
4.	Source Subsoil	As much information as possible: Date Delivered, volume/weight delivery, supplier, certification, source address (yard), original source address (site).
5.	Description Subsoil	Full Description: Grading (Particle Size: clay, silt, sand, gravel), organic content, colour, odour, minerals, stone, glass, slate, ash, clinker, coal, coke, tarmac, plastic, other?
6.	Sample Subsoil	Date sampled, date submitted, sample reference, laboratory, laboratory job number



POS Boundary



Trial Pit Location



Station House
Station Road, Ruabon
Wrexham, LL14 6DL
Tel: 01978 822367
Fax: 01978 824718

www.smithgrant.co.uk
email: info@smithgrant.co.uk

Project:
Heyford - Village Centre North
POS Area

Drawing:
Trial Pit Locations

Drawn: SM Checked: DW

Date: 03.11.2020 Scale: NTS

Job No: R1742d Drg No: D01

Smith Grant LLP

Station House

Station Road

Ruabon

Wrexham

LL14 6DL



4225



Attention : Scott Miller

Date : 11th November, 2020

Your reference : R1742d

Our reference : Test Report 20/14399 Batch 1

Location : Heyford (Dorchester)

Date samples received : 20th October, 2020

Status : Final report

Issue : 1

Three samples were received for analysis on 20th October, 2020 of which three 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:



Phil Sommerton BSc

Senior Project Manager

Please include all sections of this report if it is reproduced

Client Name: Smith Grant LLP
Reference: R1742d
Location: Heyford (Dorchester)
Contact: Scott Miller

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	
20/14399	1	POS-TS1	0.00-0.30	2	11/11/2020	General Description (Bulk Analysis)	soil/stones	
						11/11/2020	Asbestos Fibres	NAD
						11/11/2020	Asbestos ACM	NAD
						11/11/2020	Asbestos Type	NAD
						11/11/2020	Asbestos Level Screen	NAD
20/14399	1	POS-TS2	0.00-0.30	4	11/11/2020	General Description (Bulk Analysis)	soil/stones	
						11/11/2020	Asbestos Fibres	NAD
						11/11/2020	Asbestos ACM	NAD
						11/11/2020	Asbestos Type	NAD
						11/11/2020	Asbestos Level Screen	NAD
20/14399	1	POS-TS3	0.00-0.30	6	11/11/2020	General Description (Bulk Analysis)	soil/stones	
						11/11/2020	Asbestos Fibres	NAD
						11/11/2020	Asbestos ACM	NAD
						11/11/2020	Asbestos Type	NAD
						11/11/2020	Asbestos Level Screen	NAD

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/14399

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.

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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

EMT Job No: 20/14399

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S 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
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	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.	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	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	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
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	No
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

EMT Job No: 20/14399

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
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.			AD	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	Yes	AD	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.			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
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	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 (comparabl	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	Yes	AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes	Yes	AD	Yes
TM76	Modified US EPA method 120.1 (1982). Determination of Specific Conductance by Metrohm automated probe analyser.	PM58	Dried and ground solid samples are extracted with water in a 5:1 water to solid ratio, the samples are shaken on an orbital shaker.			AD	Yes

Job name	Heyford - Village Centre North
Job no.	R1742d
Date:	03.11.20
Author:	SM
Laboratory:	Element Deeside
Lab. Reference:	20/14399



PAH concentrations

sample identity	POS-TS1	POS-TS2	POS-TS3																
phenanthrene	16.43	1.41	4.91																
anthracene	5.4	0.47	1.43																
fluoranthene	26.2	2.02	7.84																
pyrene	18.96	1.4	5.6																
benz(a)anthracene	12.98	0.91	3.42																
chrysene	14.49	1.2	4.17																

PAH units

PAH ratios

phe/ant	3.043	3.000	3.434																
flu/pyr	1.382	1.443	1.400																
baa/chr	0.896	0.758	0.820																

