Validation Report

Plot 6
Fleet Road
Fleet Hargate
Spalding
Lincolnshire
PE12 8LE

Prepared for:

R.K Wilson Builders Ltd
Sandpit Farm
Wisbech Road
Long Sutton
Spalding
Lincolnshire
PE12 9AQ

EPS Reference Number:	UK18.3037d
Date Issued:	26th September 2019
Report Status:	Issue 1

PLOT 6, FLEET ROAD, SPALDING

NON-TECHNICAL CLIENT SUMMARY

This report presents the findings of a soil validation exercise which was undertaken to confirm that an appropriate thickness of imported material has been installed at the site. Pertinent findings and conclusions are summarised as follows:

- Previous intrusive investigation work carried out by EPS in November 2018 identified elevated concentrations of PAH compound benzo(a)pyrene within the shallow soils at the site.
- Following recommendations by EPS it was agreed that a minimum 425mm thickness of clean imported topsoil should be installed within soft landscaped areas of the new development.
- EPS returned to validate the quality and thickness of imported topsoil. It was concluded that an appropriate thickness and quality of material had been installed, reducing the risk to future site users to an acceptable level.
- A copy of this report should be provided to the Environmental Health Department of South Holland District Council and the NHBC so that it may be incorporated into their land quality records and to facilitate discharge of associated planning conditions.

By their very nature, the above bullet points represent a simplified summary of our work and should not be relied upon to form the basis for key decisions for the proposed development. A full picture is provided in the following report, or alternatively give us a call and we'll talk you through it.

Project Reference:	UK18.3037d	
Title:	Validation Report – Plot 6, Fleet Road, Spalding	
Client:	R.K Wilson Builders	
Date:	26th September 2019	
EPS Contact Details:	7B Caxton House Broad Street Cambourne Cambridge CB23 6JN	T: 01954 710666 F: 01954 710677 E: info@epstrategies.co.uk W: www.epstrategies.co.uk
Status:	Issue 1	

Author:	**Reviewed:**	**Authorised:**
		
Shaun Cahill	Kasia Borthwick	Steve Bullock
Consultant	Principal Consultant	Director

This report has been prepared for the client(s) listed on the report title page. EPS accepts no liability or responsibility for use of, or reliance upon, this report and / or the information contained within it by third parties.

If third parties have been contracted / consulted during compilation of this report, the validity of any data they may have supplied, and which are included in the report, have been assessed as far as possible by EPS however, EPS cannot guarantee the validity of these data.

No part of this report, or references to it, may be included in published documents of any kind without approval from EPS.

This report and its contents, together with any supporting correspondence or other documentation, remain the property of Environmental Protection Strategies Ltd until paid for in full.

The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' in house quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

TABLE OF CONTENTS

1 INTRODUCTION 1
1.1 Previous Reports 1
1.2 Limitations and Constraints 1
2 VALIDATION WORKS 3
2.1 Summary of Investigations 3
2.1.1 Location and Thickness of Imported Material 3
2.1.2 Chemical Verification of Imported Material 3
2.2 Findings 3
2.2.1 Ground Conditions 3
2.2.2 Physical Evidence of Contamination 3
2.2.3 Chemical Testing of Imported Material 4
2.3 Evaluation of Findings 4
3 VALIDATION STATEMENT 6

Figures

Figure 1 Site Location Plan
Figure 2 Validation Borehole Location Plan

Appendices

Appendix A Selected Site Photographs
Appendix B Laboratory Results – Environmental
Appendix C Minimal & Low Risk Generic Screening Criteria

1 INTRODUCTION

In September 2019, Environmental Protection Strategies Ltd (EPS) was commissioned by R.K Wilson Builders to produce a Validation Report following the installation of a clean topsoil cover system within domestic garden areas associated with the recently developed residential property at Plot 6, Fleet Road, Fleet Hargate, Spalding, Lincolnshire, PE12 8LE ('the site') (see Figure 1).

Redevelopment work at the site included the construction of 23 residential properties with associated domestic garden areas under the South Holland District Council planning reference H05-0308-17.

This report presents a summary of a recent soil validation exercise undertaken by EPS, at Plot 6.

1.1 Previous Reports

This work has been undertaken subsequent to recommendations made in the reports listed below, (which should be referenced for further information):

- *Phase I Geo-Environmental Assessment, Land at 184 Fleet Road, Fleet Hargate, Spalding, PE12 8LE - March 2018* (EPS Report Ref: UK18.3037)
- *Phase II Environmental Assessment, Land at 184 Fleet Road, Fleet Hargate, Spalding, PE12 8LE - April 2018* (EPS Report Ref: UK18.3037b)
- *Supplementary Ground Investigation, Land at 184 Fleet Road, Fleet Hargate, Spalding, PE12 8LE – November 2018* (EPS Report Ref: UK18.3037c)

Previous works identified concentrations of PAH compound benzo(a)pyrene in the shallow soils sampled from Plot 6 that exceeded relevant screening criteria representative of minimal risks to human health. In addition, low concentrations of asbestos fibres (<0.001%) were found within one of the soil samples.

In order to break potential contaminant linkages associated with exposure to benzo(a)pyrene by future users, a topsoil cover system was recommended including provision of a minimum of 425mm of clean imported topsoil within soft landscaped at Plot 6. This approach has been considered in accordance with BRE publication: *Cover Systems for Land Regeneration: Thickness Design of Cover Systems for Contaminated Land* (BRE, Mar 2004).

1.2 Limitations and Constraints

The purpose of this report is to present the findings of a soil validation exercise conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, Environmental Protection Strategies Ltd (EPS) makes the following statements:

No investigation method is capable of completely identifying all the contaminants that might be present in the soil or groundwater under a site. Where outlined in our report, we have examined the ground beneath a site by constructing a number of boreholes and / or trial pits. The locations of these excavations and sampling points are considered to be representative of the condition of the whole site subsurface. However, ground conditions are naturally variable and it may be possible that localised ground controls could influence the spread of contaminants within the site subsurface.

For this reason, it is possible that samples collected during the investigation may not represent the conditions across the entire site.

If third parties have been contracted / consulted during compilation of this report, the validity of any data they may have supplied, and which are included in the report, have been assessed as far as possible by EPS however, EPS cannot guarantee the validity of these data.

The report has been prepared for the client(s) listed on the report title page and has been subject to standard internal EPS review procedures. EPS accepts no liability or responsibility for use of, or reliance upon, this report and / or the information contained within it by third parties.

No part of this report, or references to it, may be included in published documents of any kind without approval from EPS.

This report and its contents, together with any supporting correspondence or other documentation, remain the property of Environmental Protection Strategies Ltd until paid for in full.

2 VALIDATION WORKS

Following construction of the residential properties and associated areas of soft landscaping, EPS was commissioned to validate the thickness and quality of the installed cover system. An EPS engineer attended site on 17th September 2019 and details of this work are included within the sections below.

2.1 Summary of Investigations

2.1.1 Location and Thickness of Imported Material

Inspection of the imported topsoil thickness was conducted using a hand auger (HA1-HA5) and their locations are detailed within Figure 2.

It is understood that the cover system was installed to the front and rear of the property, within domestic garden areas in the north and south.

A number of photographs were taken to confirm the topsoil installation within these areas and all relevant photographs are included as Appendix A for reference.

2.1.2 Chemical Verification of Imported Material

EPS collected five samples of the topsoil material from the site and had these samples analysed for a broad range of contaminants by Element Materials Technology of Deeside, a UKAS accredited laboratory.

The five samples EPS collected were obtained from the front and rear of the property (Plot 6) in the northeast.

Laboratory results for the topsoil material tested by EPS are included as Appendix B of this report.

2.2 Findings

2.2.1 Ground Conditions

EPS confirmed that generally a minimum of 425mm of imported material had been installed within the landscaped areas at the front and rear of the development.

Ground conditions encountered from the surface at HA1-HA5 included a layer of topsoil comprising a dark brown slightly clayey gravelly sandy silty material that extended beyond the maximum depth of cover at 425mm.

2.2.2 Physical Evidence of Contamination

Topsoil materials imported to the site did not include any visual or olfactory evidence of contamination.

2.2.3 Chemical Testing of Imported Material

The key results of laboratory testing on soil samples are summarised below and all soil sample results obtained by the laboratory are included as Appendix B.

Contaminant	No. of Samples	No of Detections	Range of Detections (mg/kg)		Highest Location & Depth (m bgl)
			Min	Max	
Arsenic	5	5	16.8	24.3	HA1 (0.1-0.425)
Cadmium	5	0	-		
Chromium III	5	5	32.5	65.8	HA4 (0.1-0.425)
Chromium VI	5	0	-		
Copper	5	5	34	52	HA3 (0.1-0.425)
Lead	5	5	53	62	HA5 (0.1-0.425)
Mercury	5	0	-		
Nickel	5	5	23.6	27.8	HA1 (0.1-0.425)
Selenium	5	0	-		
Zinc	5	5	118	160	HA1 (0.1-0.425)
Naphthalene	5	1	0.05		HA3 (0.1-0.425)
Benzo(a)pyrene	5	5	0.60	1.83	HA3 (0.1-0.425)
Dibenz(ah)anthracene	5	5	0.07	0.25	HA3 (0.1-0.425)
PAH (Total of 16)	5	5	5.4	23.7	HA3 (0.1-0.425)
ACM (%)	5	1	<0.001%		HA3 (0.1-0.425)

Notes:
- Contaminant not found above laboratory detection limits
PAH Polycyclic Aromatic Hydrocarbons
ACM Asbestos Containing Material

- Metals and PAH compounds were identified at low concentrations within the topsoil samples analysed with select contaminants not identified above minimum laboratory detection limits.
- Chrysotile asbestos fibre bundles were identified within a single sample collected from HA3 (0.1-0.425) although subsequent quantification has shown concentrations to fall below trace levels (<0.001 % mass)

2.3 Evaluation of Findings

As the site has been redeveloped for a residential end use, and to remain consistent with the previous phase of works, laboratory analysis of the topsoil has been compared against generic screening criteria relevant to a residential setting (with plant uptake). The technical framework used to derive the screening values and the documents in which they are published are summarised as follows:

- *EA Science Reports* (SC050021/SR2, SC050021/SR3, and SC050021/SR7)
- *EA Soil Guideline Value Science Reports*
- *Suitable For Use Levels ('S4ULs') for Human Health Risk Assessment* – LQM and CIEH (2015)
- *Soil Generic Assessment Criteria for Human Health Risk Assessment* - EIC/AGS/CL:AIRE (2010)

Category 4 Screening Levels (C4SLs) released in December 2013 by The Department for the Environment, Food and Rural Affairs (DEFRA), (*Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010*) provide generic suitable for use screening values for common contaminants in a variety of land uses and are utilised as appropriate 'low risk' generic screening criteria.

For concentrations of Lead and BaP in soil, EPS has used DEFRAs C4SL as an appropriate guide for professional judgement with respect to reasonable 'low risk' levels in the context of this site and its suitability for use.

Given that all reported concentrations of the contaminants fall significantly below the relevant screening criteria, the imported topsoil material at the site is considered suitable for use in the context of the site.

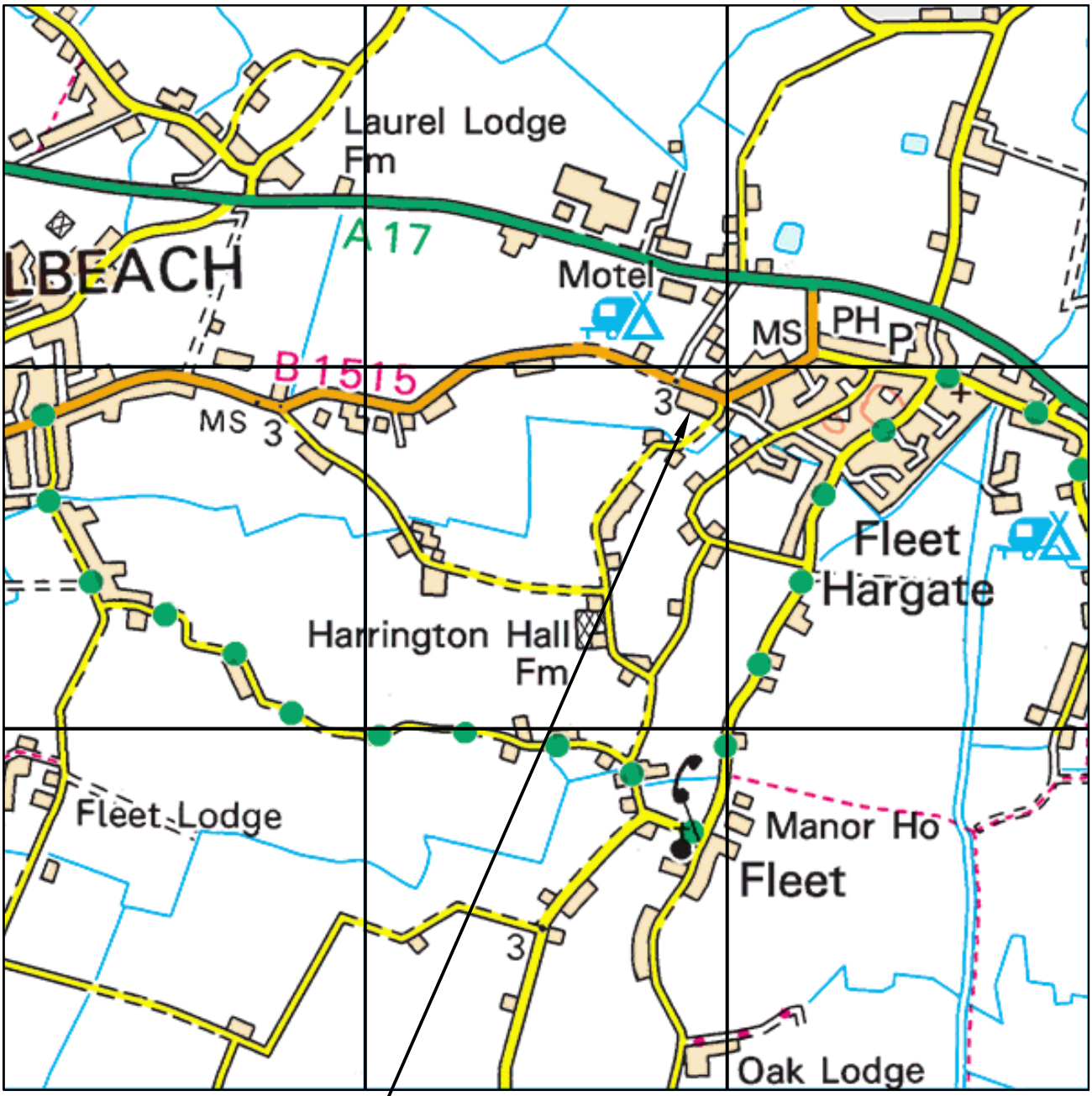
A summary of the screening criteria and the methodology used to derive them is included in Appendix C.

3 VALIDATION STATEMENT

On the basis of the information provided by third parties and the results of the validation sampling described in this report, it is concluded by EPS that the installation of a topsoil cover system has been successfully completed in accordance with the recommendations made in the previous Supplementary Ground Investigation report. The control measures which have been implemented are considered to have reduced the risks posed to site users by subsurface soils to acceptable levels and the site is now considered fit for its proposed residential end use.

It is recommended that a copy of this report is provided to the Environmental Health Department of South Holland District Council and the NHBC so that it may be incorporated into their land quality records and to facilitate discharge of associated planning conditions.

FIGURES



Approximate Site Location

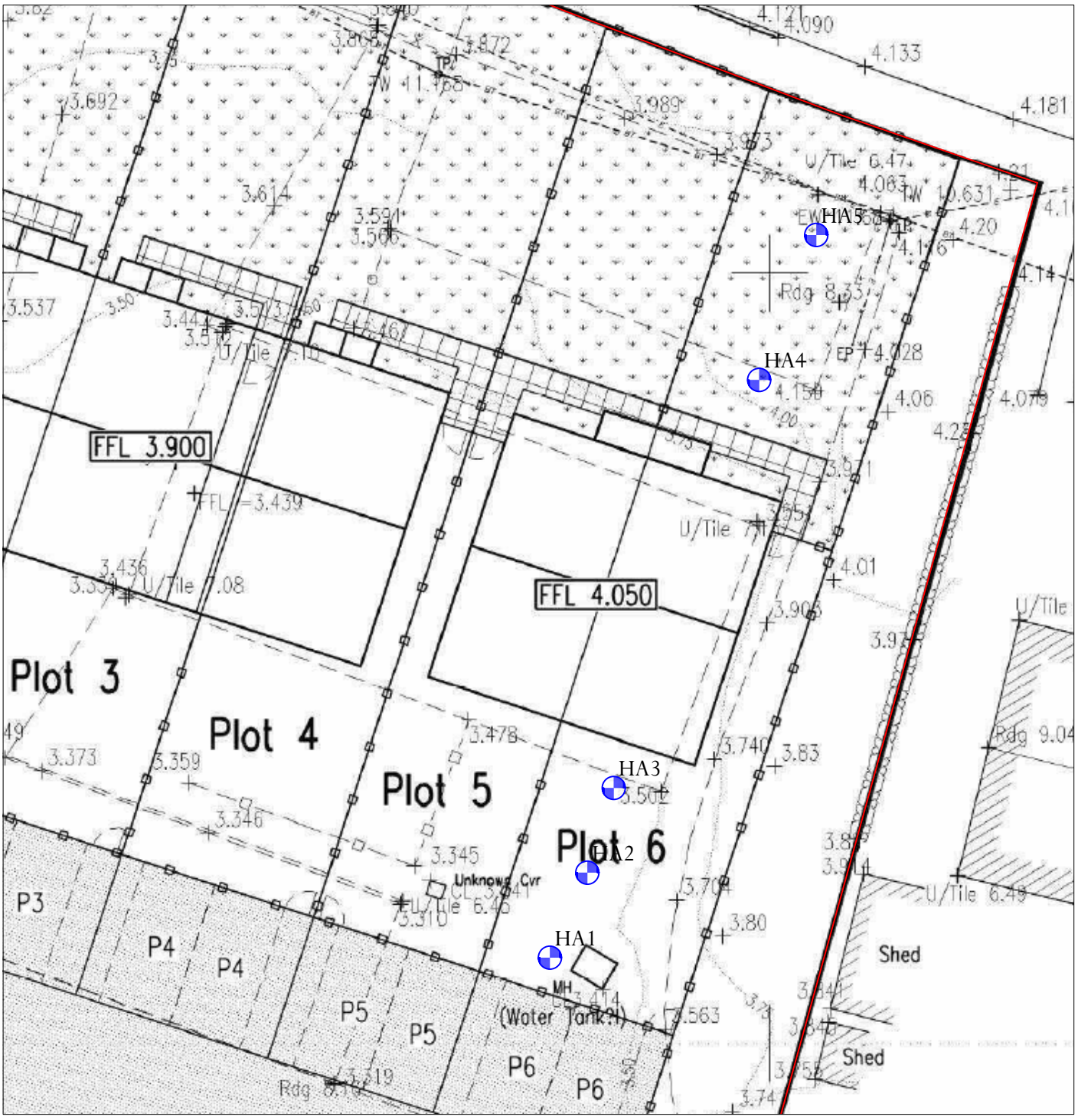
Crown Copyright. All rights reserved.
Licence Number: 100054115

Title: Site Location Plan

Project: Plot 6, Fleet Road, Fleet Hargate, Spalding, PE12 8LE

Fig No: 1

Scale:	NTS
Drawn By:	JB
Approved By:	WE
Job No:	UK18.3037d
Dwg No:	Lincolnshire/0919/01
Date:	September 2019



— Approximate Site Boundary

Approximate Borehole Location

Please note: Image supplied by client

Title: Validation Borehole Location Plan

Project: Plot 6, Fleet Road, Fleet Hargate, Spalding, PE12 8LE

Fig No: 2

Scale:	NTS
Drawn By:	SC
Approved By:	KB
Job No:	UK18.3037d
Dwg No:	Lincolnshire/0919/02
Date:	September 2019

APPENDIX A

Selected Site Photographs

Photo 1: HA1 location in the rear garden	Photo 2: HA1 depth
	
Photo 3: HA3 location in the rear garden	Photo 4: HA3 material
	
Photo 5: HA5 location in the front garden	Photo 6: HA5 depth
	

APPENDIX B

Laboratory Results – Environmental

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

EPS Ltd
7B Caxton House
Broad Street
Cambourne
Cambridgeshire
CB23 6JN

Attention :	Shaun Cahill
Date :	25th September, 2019
Your reference :	UK18.3037D
Our reference :	Test Report 19/15199 Batch 1
Location :	Fleet Road Spalding
Date samples received :	19th September, 2019
Status :	Final report
Issue :	1

Five samples were received for analysis on 19th September, 2019 of which five 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: EPS Ltd
Reference: UK18.3037D
Location: Fleet Road Spalding
Contact: Shaun Cahill
EMT Job No: 19/15199

Report : Solid

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

EMT Sample No.	1	2	3	4	5						LOD/LOR	Units	Method No.
Sample ID	HA1	HA2	HA3	HA4	HA5								
Depth	0.10-0.425	0.10-0.425	0.10-0.425	0.10-0.425	0.10-0.425								
COC No / misc													
Containers	J	J	J	J	J								
Sample Date	17/09/2019	17/09/2019	17/09/2019	17/09/2019	17/09/2019								
Sample Type	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam								
Batch Number	1	1	1	1	1								
Date of Receipt	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019								
Arsenic #M	24.3	19.4	-	18.2	17.6						<0.5	mg/kg	TM30/PM15
Cadmium #M	<0.1	<0.1	-	<0.1	<0.1						<0.1	mg/kg	TM30/PM15
Chromium #M	41.2	42.8	-	65.8	59.1						<0.5	mg/kg	TM30/PM15
Copper #M	34	41	-	36	46						<1	mg/kg	TM30/PM15
Lead #M	58	57	-	53	62						<5	mg/kg	TM30/PM15
Mercury #M	<0.1	<0.1	-	<0.1	<0.1						<0.1	mg/kg	TM30/PM15
Nickel #M	27.8	26.1	-	23.6	23.9						<0.7	mg/kg	TM30/PM15
Selenium #M	<1	1	-	<1	<1						<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #M	1322	1514	-	1068	1341						<50	mg/kg	TM50/PM29
Zinc #M	160	139	-	118	128						<5	mg/kg	TM30/PM15
Arsenic	-	-	16.8	-	-						<0.5	mg/kg	TM30/PM62
Cadmium	-	-	<0.1	-	-						<0.1	mg/kg	TM30/PM62
Chromium	-	-	32.5	-	-						<0.5	mg/kg	TM30/PM62
Copper	-	-	52	-	-						<1	mg/kg	TM30/PM62
Lead	-	-	56	-	-						<5	mg/kg	TM30/PM62
Mercury	-	-	<0.1	-	-						<0.1	mg/kg	TM30/PM62
Nickel	-	-	23.9	-	-						<0.7	mg/kg	TM30/PM62
Selenium	-	-	<1	-	-						<1	mg/kg	TM30/PM62
Total Sulphate as SO4	-	-	1187	-	-						<50	mg/kg	TM50/PM129
Zinc	-	-	134	-	-						<5	mg/kg	TM30/PM62
PAH MS													
Naphthalene #M	<0.04	<0.04	0.05	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.10	0.10	0.36	0.09	0.10						<0.03	mg/kg	TM4/PM8
Acenaphthene #M	<0.05	<0.05	0.11	<0.05	0.06						<0.05	mg/kg	TM4/PM8
Fluorene #M	<0.04	<0.04	0.20	<0.04	0.06						<0.04	mg/kg	TM4/PM8
Phenanthrene #M	0.46	0.39	2.75	0.25	0.91						<0.03	mg/kg	TM4/PM8
Anthracene #	0.20	0.20	0.98	0.15	0.36						<0.04	mg/kg	TM4/PM8
Fluoranthene #M	1.24	1.30	4.28	0.79	1.87						<0.03	mg/kg	TM4/PM8
Pyrene #	1.13	1.16	3.50	0.72	1.58						<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.67	0.72	1.87	0.46	1.10						<0.06	mg/kg	TM4/PM8
Chrysene #M	0.68	0.73	1.80	0.46	0.96						<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #M	1.40	1.57	3.31	1.01	1.88						<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.77	0.89	1.83	0.60	1.05						<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	0.55	0.62	1.25	0.40	0.81						<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.07	0.09	0.25	0.07	0.12						<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.47	0.54	1.15	0.40	0.69						<0.04	mg/kg	TM4/PM8
PAH 16 Total	7.7	8.3	23.7	5.4	11.6						<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	1.01	1.13	2.38	0.73	1.35						<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.39	0.44	0.93	0.28	0.53						<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	107	109	103	101	104						<0	%	TM4/PM8
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15						<0.15	mg/kg	TM26/PM21

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: EPS Ltd
Reference: UK18.3037D
Location: Fleet Road Spalding
Contact: Shaun Cahill
EMT Job No: 19/15199

Report : Solid

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

EMT Sample No.	1	2	3	4	5						LOD/LOR	Units	Method No.
Sample ID	HA1	HA2	HA3	HA4	HA5								
Depth	0.10-0.425	0.10-0.425	0.10-0.425	0.10-0.425	0.10-0.425								
COC No / misc													
Containers	J	J	J	J	J								
Sample Date	17/09/2019	17/09/2019	17/09/2019	17/09/2019	17/09/2019								
Sample Type	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam								
Batch Number	1	1	1	1	1								
Date of Receipt	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019								
Natural Moisture Content	24.0	23.4	22.7	24.2	24.8						<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3						<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #M	0.3197	0.3867	-	0.2742	0.3412						<0.0015	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext)	-	-	0.2612	-	-						<0.0015	g/l	TM38/PM60
Chromium III	41.2	42.8	-	65.8	59.1						<0.5	mg/kg	NONE/NONE
Chromium III	-	-	32.5	-	-						<0.5	mg/kg	NONE/NONE
Total Cyanide #M	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	mg/kg	TM89/PM45
Organic Matter	4.2	4.2	NDP	4.1	4.4						<0.2	%	TM21/PM24
Organic Matter	-	-	4.1	-	-						<0.2	%	TM21/PM89
pH #M	7.73	7.81	7.82	7.76	7.82						<0.01	pH units	TM73/PM11
Sample Type	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam	Clayey Loam							None	PM13/PM0
Sample Colour	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown							None	PM13/PM0
Other Items	Stones	Stones	Stones	Stones, roots	Stones							None	PM13/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: EPS Ltd
Reference: UK18.3037D
Location: Fleet Road Spalding
Contact: Shaun Cahill

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.

Signed on behalf of Element Materials Technology:



Ryan Butterworth
Asbestos Team Leader

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
19/15199	1	HA1	0.10-0.425	1	19/09/2019	**General Description (Bulk Analysis)**	soil/stones
					19/09/2019	**Asbestos Fibres**	NAD
					19/09/2019	**Asbestos ACM**	NAD
					19/09/2019	**Asbestos Type**	NAD
					19/09/2019	**Asbestos Level Screen**	NAD
19/15199	1	HA2	0.10-0.425	2	19/09/2019	**General Description (Bulk Analysis)**	soil/stones
					19/09/2019	**Asbestos Fibres**	NAD
					19/09/2019	**Asbestos ACM**	NAD
					19/09/2019	**Asbestos Type**	NAD
					19/09/2019	**Asbestos Level Screen**	NAD
19/15199	1	HA3	0.10-0.425	3	19/09/2019	**General Description (Bulk Analysis)**	soil/stones
					19/09/2019	**Asbestos Fibres**	Fibre Bundles
					19/09/2019	**Asbestos ACM**	NAD
					19/09/2019	**Asbestos Type**	Chrysotile
					19/09/2019	**Asbestos Level Screen**	less than 0.1%
					24/09/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					24/09/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					24/09/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					24/09/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					24/09/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/15199	1	HA4	0.10-0.425	4	20/09/2019	**General Description (Bulk Analysis)**	soil.stones
					20/09/2019	**Asbestos Fibres**	NAD
					20/09/2019	**Asbestos ACM**	NAD
					20/09/2019	**Asbestos Type**	NAD
					20/09/2019	**Asbestos Level Screen**	NAD
19/15199	1	HA5	0.10-0.425	5	20/09/2019	**General Description (Bulk Analysis)**	soil.stones
					20/09/2019	**Asbestos Fibres**	NAD
					20/09/2019	**Asbestos ACM**	NAD
					20/09/2019	**Asbestos Type**	NAD
					20/09/2019	**Asbestos Level Screen**	NAD

Client Name: EPS Ltd

Reference: UK18.3037D

Location: Fleet Road Spalding

Contact: Shaun Cahill

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Method No.	NDP Reason
19/15199	1	HA3	0.10-0.425	3	TM21/PM24	Asbestos detected in sample

Client Name: EPS Ltd
Reference: UK18.3037D
Location: Fleet Road Spalding
Contact: Shaun Cahill

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 19/15199						

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.: 19/15199

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 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

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

EMT Job No: 19/15199

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
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	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
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.	PM89	Preparation of positive asbestos samples for Eltra analysis			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	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	Yes	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	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes

EMT Job No: 19/15199

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
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+) comparable to BS ISO 15923-1, 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	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+) comparable to BS ISO 15923-1, 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
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+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM60	As received solid samples are extracted with deionised water in a 2:1 ratio of water to solid.			AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM129	A hot hydrochloric acid digest is performed on an as received sample, and the resulting liquor is analysed.			AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes	Yes	AD	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	Yes	AR	No
TM89	Modified USEPA method OIA-1667. 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 and Thiocyanate analysis.	Yes	Yes	AR	Yes
TM131	Quantification of Asbestos Fibres and ACM, based on HSG248 and SCA method.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes

EMT Job No: 19/15199

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
NONE	No Method Code	NONE	No Method Code			AR	Yes

APPENDIX C

Minimal & Low Risk Generic Screening Criteria

EPS Generic Quantitative Risk Assessment

Generic Screening Criteria (C4SLs) - All Land Uses

Contaminant	Soil Targets					
	Residential		Allotments	Commercial	Public Open Spaces	
	With Home Grown Produce	Without Home Grown Produce			Residential	Parks
Unit	mg/kg					
Arsenic	37	40	49	640	79	168
Benzene	0.87	3.3	0.18	98	140	230
Benzo(a)pyrene	5	5.3	5.7	76	10	21
Cadmium	26	149	4.9	410	220	880
Chromium (VI)	21	21	170	49	23	250
Lead	200	310	80	2330	630	1300

Notes:

Targets for Human Health have been taken from the publicly available Category 4 Screening Levels (C4SLs) for assessment of land affected by contamination issued by DEFRA in December 2013.

Within the modelling for C4SLs, a Soil Organic Matter content of 6% has been used. Reference to site-specific data should be made where possible. EPS have carried out a sensitvity analysis in-house and the contaminant benzene is the current C4SL most susceptable to changes in SOM and therefore any risk assessment for this compound must account for this aspect.

EPS Generic Quantitative Risk Assessment - Residential Land Use

Contaminant	Soil Targets			Groundwater Targets	
	Human Health	Controlled Waters		Controlled Waters	
		LGwRP	HGwRP	LGwRP	HGwRP
Unit	**mg/kg**			**ug/l**	
Arsenic	See C4SL	n/c	n/c	50	10
Cadmium	11	n/c	n/c	5	5
Chromium III	See C4SL	n/c	n/c	250	50
Chromium VI	See C4SL	n/c	n/c	n/c	n/c
Copper	2400	n/c	n/c	28	28
Mercury (elemental)	1.2	n/c	n/c	1	1
Nickel	180	n/c	n/c	200	50
Lead	See C4SL	n/c	n/c	250	10
Selenium	250	n/c	n/c	10	10
Zinc	3700	n/c	n/c	500	500
Benzene	See C4SL	0.252	0.008	30	1
Toluene	130	1.17	1.17	50	50
Ethylbenzene	47	15.0	10.0	300	200
Xylene (para)	56	0.885	0.885	30	30
MTBE#	49	0.138	0.0276	75	15
Benzo(a)Pyrene	See C4SL	10	1.44	0.7	0.1
Naphthalene	2.3	0.934	0.02	10	0.1
Dibenz(ah)anthracene	0.24	n/c	n/c	n/c	n/c
Aliphatic C5-C6	42	5.27	1.05	50	10
Aliphatic C6-C8	100	23.2	4.64	50	10
Aliphatic C8-C10	27	175	35.1	50	10
Aliphatic C10-C12	130(48)*	1380	276	50	10
Aliphatic C12-C16	1100(8.48)**	27500	5490	50	10
Aliphatic C16-C35	65000 (8.48)**	3.46E+06	6.91E+05	50	10
Aromatic C8-C10	34	8.74	1.75	50	10
Aromatic C10-C12	74	13.8	2.76	50	10
Aromatic C12-C16	140	27.5	5.5	50	10
Aromatic C16-C21	260	86.9	17.4	50	10
Aromatic C21-C35	1100	690	138	50	10

Notes:
LGwRP - Low Groundwater Resource Potential HGwRP - High Groundwater Resource Potential
f = Oral, dermal and inhalation exposure compared with oral HCV N/C = Not Calculated
* = S4UL exceeds vapour saturation limit (in brackets) ** = S4UL exceeds solubility saturation limit (in brackets)

Soil Targets

Targets for Human Health have been taken from *S4ULs 'Suitable For Use Levels for Human Health Risk Assessment' – LQM and CIEH (2014)* derived using standard sandy loam soil with 1% SOM, except (#) = *EIC/AGS/CL:AIRE GAC 'Soil Generic Assessment Criteria' (2010)* . For sites where ground conditions differ significantly from sandy loam or site-specific SOM and pH are available, the generic human health targets may be revised.

Targets for Controlled waters have been derived using EA Remedial Targets Worksheet (v3.1) - using standard Sandy Loam ground conditions as described in Science Report SC050021/SR3, assuming no degradation for a 10m compliance distance with criteria of EQS or UKDWS for LGwRP and HGwRP respectively (see notes for GW targets).

Groundwater Targets

For LGwRP, targets have been taken as Freshwater EQS where available. For Ethylbenzene and BaP the WHO Health limit has been used and for MTBE and individual TPH fractions a 5 times multiplier of taste threshold and UKDWS has been taken repectively.
For HGwRP, targets have been taken as UKDWS where available, with the exception of Copper and Zinc where the EQS is lower than the DWS and therefore the EQS has been used as the groundwater target. For Ethlylbenzene the upper WHO ATO limit has been used. For Toluene and Xylene, the WHO ATO limit is higher than the EQS and so the lower value has been taken. For MTBE the taste threshold has been taken.

Work carried out to calculate generic screening criteria for concentrations of contaminant in groundwater with respect of risks to Human Health has generally found that criteria far exceed (by at least 2 orders of magnitude) those listed for the protection of either LGwRP and HGwRP receptors. On this basis, the above Groundwater criteria are also considered protective of human health and further evaluation of these risks should be considered alongside any detailed quantitative risk assessments carried out for groundwater on a site specific basis.

7B Caxton House
Broad Street
Cambourne
Cambridge CB23 6JN

T +44 (0) 1954 710666
F +44 (0) 1954 710677
E info@epstrategies.co.uk
W www.epstrategies.co.uk

Registered Number: 4330320

ISO 9001
Certificate No. GB2003472

SafeContractor
APPROVED

CHAS
Accredited Contractor
CHAS.co.uk