
Solum House
Unit 1 Elliott Court
St. Johns Road
Meadowfield
Durham
DH7 8PN

Tel: 0191 378 6380

e-mail: admin@arc-environmental.com
www.arc-environmental.com



VALIDATION REPORT

ESH CONSTRUCTION

RESIDENTIAL DEVELOPMENT

HILL END ROAD

MAPPLEWELL

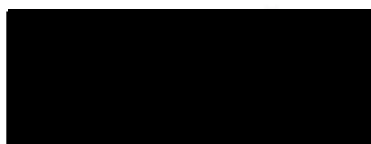
BARNSELEY

S75 6DX

Project No: 18-194

Prepared By:

Matt Bradford

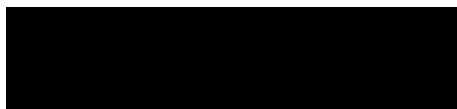


Date:

27th June 2019

Approved By:

John Ditchburn



Date:

The information and/or advice contained in this Validation Report is based solely on, and is limited to, the boundaries of the site, the immediate area around the site, and the historical use(s) unless otherwise stated. This 'Report' has been prepared in order to collate information relating to the physical, environmental and industrial setting of the site, and to highlight, where possible, the likely problems that might be encountered when considering the future development of this site for the proposed end use. All comments, opinions, diagrams, cross sections and/or sketches contained within the report, and/or any configuration of the findings is conjectural and given for guidance only and confirmation of the anticipated ground conditions should be considered before development proceeds. Agreement for the use or copying of this report by any Third Party must be obtained in writing from Arc Environmental Limited (ARC). If a change in the proposed land use is envisaged, then a reassessment of the site should be carried out.

CONTENTS

1.0 INTRODUCTION	Page 3
2.0 SITE DETAILS	Page 3
3.0 SCOPE OF WORKS	Page 3
4.0 REMEDIATION STATEMENT & SUPPLEMENTARY PHASE 2: GROUND INVESTIGATION WORKS - SUMMARY	Page 3
5.0 VALIDATION WORKS	Page 4
5.1 – Suitability of Topsoil & Subsoil Materials Prior to Importation	Page 4
5.2 – Suitability of Topsoil & Subsoil Materials after Emplacement	Page 4
5.3 – Implementation of Clean Cover Materials	Page 5
6.0 CONCLUSIONS	Page 6
Appendix I Site Layout Plan showing areas of clean cover and sample locations	
Appendix II Confirmatory Testing Results for Topsoil & Subsoil Materials (Prior to Importation)	
Appendix III Validation Testing Results for Topsoil and Subsoil Materials (Following Emplacement)	
Appendix IV Photographic Record Sheets	

1.0 Introduction

June 2019

As requested by Esh Construction, and in conjunction with a Remediation Method Statement prepared for this site by GRM Development Solutions (Ref. P6671 – August 2014) and Supplementary Phase 2: Ground Investigation Report prepared for this site by Arc Environmental Ltd (Ref. 16-737 – June 2017), a Validation Report has been compiled to verify the completion of clean cover installation for the residential development on Hill End Road in Mapplewell, Barnsley.

2.0 Site Details

Table 2.1

Site Name & Address:	Residential Development, Hill End Road, Mapplewell, Barnsley S75 6DX.
Description of Location & Site Setting:	The site lies to the northeast of properties fronting onto Spey Close, to the immediate west of Hill End Road and south of Edward Street. The site is located approximately 3 km north northwest of Barnsley town centre.

3.0 Scope of Works

Table 3.1

Client:	Esh Construction.
Project type:	Residential Development.
Layout plan:	See Appendix I.
Scope of Validation Works:	Validation Works comprised: The installation of clean topsoil and subsoil materials in soft landscaped areas to a minimum depth of c.600mm (private gardens) and c.300mm (public open space) with geotextile marker layer at the base of the capping layer.
Laboratory Testing:	Contamination only.
Reporting:	Validation.

4.0 Remediation Statement & Supplementary Phase 2: Ground Investigation Works - Summary

The Remediation Statement prepared for this site by GRM Development Solutions (Ref. P6671 – August 2014) recommended:

- Hand picking of visible asbestos containing materials if encountered.
- Minimum 600mm clean capping in gardens and 300mm in other soft landscaping areas unless underlain by uncontaminated natural soils.
- Capping layer to be underlain by 150mm thick anti-dig layer (as part of the minimum 600mm thick layer) or by geotextile as appropriate (see below).
- Remedial measures below hardstanding and houses are considered not to be necessary.
- Prior to the remedial works it was recommended that made ground soil samples were obtained for asbestos analysis from a minimum of 12 locations, spread evenly over the site and situated within proposed rear garden areas, and at a depth equivalent to 600mm below final site levels. If the presence of asbestos is confirmed the capping layer shall include a 150mm thick anti dig layer. If not a geotextile marker layer at the base of the capping layer will be adequate.

As part of the Supplementary Phase 2: Ground Investigation Report prepared for this site by Arc Environmental Ltd (Ref. 16-737 – June 2017), 12 no. made ground samples were obtained from a depth up to c.0.60m within proposed rear garden areas and analysed for the presence of asbestos. No asbestos fibres were identified within the samples of made ground and therefore a geotextile at the base of the capping layer would be adequate for the proposed soft landscaping across the site.

4.0 Remediation Statement & Supplementary Phase 2: Ground Investigation Works – Summary (Cont'd)

Arc Environmental Ltd have received contamination laboratory analysis for a source of topsoil and subsoil materials prior to importation and has undertaken the trial pits and sampling of topsoil and subsoil following emplacement on site.

A plan showing the location of the 9 hand dug pits in areas of garden and soft landscaping can be seen attached in Appendix I.

5.0 Validation Works

5.1 Suitability of Topsoil and Subsoil Materials Prior to Importation:-

During the construction works, Esh Construction identified a source of potentially suitable & ‘clean’ manufactured topsoil and subsoil materials, which were to be utilised within areas of residential gardens and public open space gardens across this site. From information provided by Esh Construction, the source supplier of these materials was K.E. Lunness Aggregates Ltd.

To ensure the suitability of the topsoil and subsoil materials for use within garden and soft landscaped areas and in line with YALPAG Guidance, confirmatory screening was provided to Arc Environmental Ltd by Esh Construction prior to importation on to site, the results of which can be seen in the Chemtest Analysis Reports – 17-14332 & 17-27678-1, copies of which are attached within Appendix II.

From the results of the soil screening completed on the topsoil and subsoil materials prior to importation on to site, all soil concentrations for these materials fall below the adopted critical concentration (C_c) values for this site as detailed within the Remediation Method Statement prepared for this site by GRM Development Solutions (Ref. P6671 – August 2014), and as such are deemed suitable for use within areas of gardens and soft landscaping.

However, to comply with the Remediation Method Statement and in line with YALPAG Guidance, it was recommended that further testing of the imported topsoil and subsoil materials was undertaken following importation to site on a ratio of one validation sample per 3 gardens (see Section 5.2).

5.2 Suitability of Topsoil & Subsoil Materials after Emplacement:-

In line with YALPAG Guidance, a total of 9 no. representative samples of topsoil and 9 no. representative samples of subsoil were obtained from trial pits on site between March 2018 and April 2019, by a representative from Arc Environmental Ltd, to confirm the suitability of these materials. The results of the testing can be found in the Chemtech Analytical Reports 70932, 71473 & 79125, copies of which are attached in Appendix III. The results were compared against adopted C_c values for this site as detailed within the Remediation Method Statement prepared for this site by GRM Development Solutions (Ref. P6671 – August 2014), the results of which are summarised in Table 5.1 on the following page:

5.0 Validation Works (Cont'd)

5.2 Suitability of Topsoil & Subsoil Materials after Emplacement (Cont'd)

Table 5.1 – Screening of Topsoil & Subsoil Materials

Analyte	Critical Conc. (C _c) mg/kg	No. of Samples Screened	Max. Conc. (C _M) recorded	No. of Samples > C _c
Generic Analytes				
Arsenic	32 ⁽¹⁾	9	17	~
Cadmium	10 ⁽¹⁾	9	0.6	~
Chromium III	614 ⁽¹⁾	9	92	~
Chromium VI	4.15 ⁽¹⁾	9	<1	~
Copper	2330 ⁽¹⁾	9	112	~
Lead	450 ⁽¹⁾	9	75	~
Mercury	170 ⁽¹⁾	9	<0.5	~
Nickel	130 ⁽¹⁾	9	22	~
Selenium	350 ⁽¹⁾	9	0.9	~
Zinc	3750 ⁽¹⁾	9	118	~
Cyanide	34 ⁽¹⁾	9	<1	~
Speciated PAH's				
Acenaphthene	210 ⁽¹⁾	9	0.61	~
Acenaphthylene	168 ⁽¹⁾	9	0.26	~
Anthracene	2300 ⁽¹⁾	9	1.01	~
Benzo(a)anthracene	3.1 ⁽¹⁾	9	2.87	~
Benzo(a)pyrene	2.2 ⁽¹⁾	9	2.01	~
Benzo(b)fluoranthene	5.6 ⁽¹⁾	9	2.19	~
Benzo(ghi)perylene	40 ⁽¹⁾	9	1.79	~
Benzo(k)fluoranthene	8.5 ⁽¹⁾	9	1.60	~
Chrysene	6 ⁽¹⁾	9	2.94	~
Dibenz(ah)anthracene	0.76 ⁽¹⁾	9	0.22	~
Fluoranthene	260 ⁽¹⁾	9	5.84	~
Fluorene	160 ⁽¹⁾	9	0.49	~
Indeno(123cd)pyrene	3.2 ⁽¹⁾	9	1.91	~
Naphthalene	1.5 ⁽¹⁾	9	0.36	~
Phenanthrene	92 ⁽¹⁾	9	3.98	~
Pyrene	560 ⁽¹⁾	9	4.86	~
Asbestos	Presence	9	NAD	~

⁽¹⁾ = Chosen Critical Concentration values for this site as detailed within the Remediation Method Statement prepared for this site by GRM Development Solutions (Ref. P6671 – August 2014).

The results of the screening have identified the following:

- None of the maximum concentrations (C_M) for any of the individual Generic or PAH analytes screened exceed the chosen C_c values for this site.
- No asbestos fibres or fragments were identified within any of the samples screened.

In summary, the level of contaminants recorded within the topsoil and subsoil materials screened do not represent a potential risk to human health (i.e. the end users) and as such are considered suitable for use within private gardens and soft landscaped areas across this site.

5.3 Implementation of Clean Cover Materials:-

In line with the Remediation Method Statement and YALPAG Guidance, validation of the implementation of the topsoil and subsoil materials was undertaken during the site development between March 2018 and April 2019. Photographic Record sheets have been produced detailing the works completed, with these attached in Appendix IV.

5.0 Validation Works (Cont'd)

5.3 Implementation of Clean Cover Materials (Cont'd):-

As stipulated within the Remediation Method Statement and Supplementary Phase 2: Ground Investigation Report, residential gardens required a 600mm capping layer made up with imported soil over a geotextile membrane, whilst public open space areas required a 300mm capping layer made up with imported soil over a geotextile membrane. On completion of the capping layer placement, 9 hand dug pits were completed to confirm the depth of the imported soil.

From the Photographic Record sheets, a confirmed 600mm thickness of clean cover comprising topsoil and subsoil materials over a geotextile membrane has been emplaced within residential gardens and 300mm thickness of clean cover comprising topsoil and subsoil materials has been emplaced within public open space areas over a geotextile membrane. Photographic record sheets detailing the implementation and validation of this clean cover and geotextile layer can also be seen attached within Appendix IV.

6.0 Conclusions

These Validation Works were undertaken in accordance with the Remediation Method Statement prepared for this site by GRM Development Solutions (Ref. P6671 – August 2014) and Supplementary Phase 2: Ground Investigation Report prepared for this site by Arc Environmental Ltd (Ref. 16-737 – June 2017) and in line with YALPAG Guidance, and comprised the following:

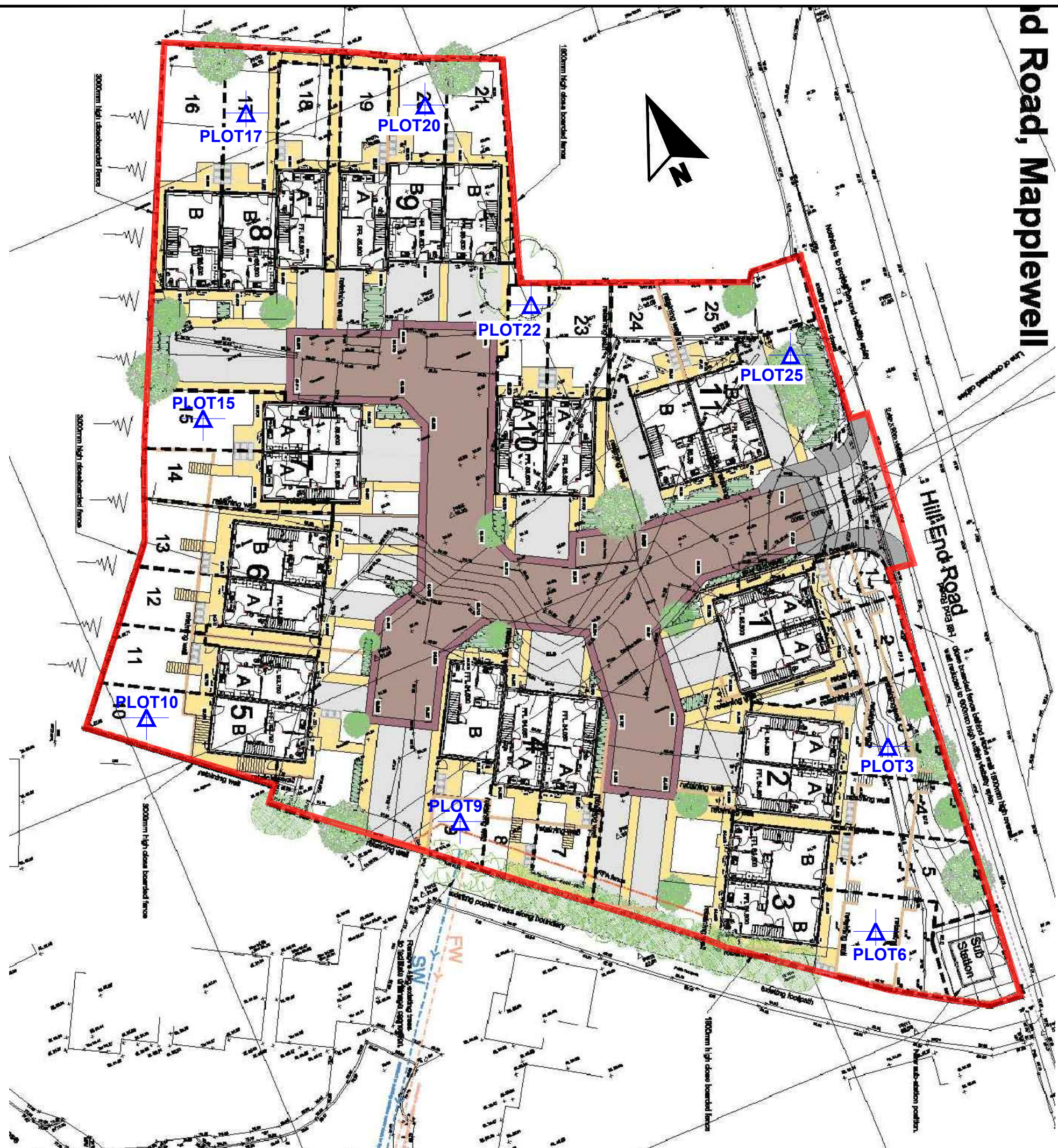
- The implementation and validation of a minimum c.600mm thickness clean cover system over a geotextile membrane within garden areas and c.300mm thickness clean cover system over a geotextile membrane within public open space areas, to provide the required level of protection to the end users.

In the opinion of Arc Environmental Ltd, and from the information supplied by the client, the validation works has been fulfilled for this site, with no further remediation works being required.

END OF REPORT

APPENDIX I

Site Layout Plan showing areas of clean cover and sample locations



APPENDIX II

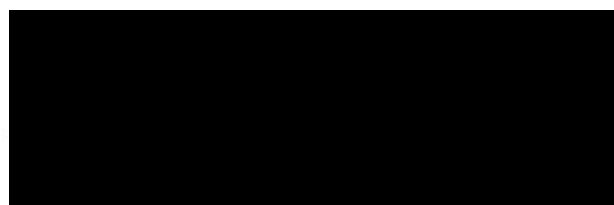
Confirmatory Testing Results for Topsoil and Subsoil Materials (Prior to Importation)



2183

Final Report

Report No.:	17-27678-1		
Initial Date of Issue:	26-Oct-2017		
Client	K.E. Lunness Aggregates Ltd		
Client Address:	Betteras Hill Road Hillam Leeds LS25 5HD		
Contact(s):	Daryl Westley		
Project	Topsoil		
Quotation No.:		Date Received:	20-Oct-2017
Order No.:		Date Instructed:	20-Oct-2017
No. of Samples:	2		
Turnaround (Wkdays):	5	Results Due:	26-Oct-2017
Date Approved:	26-Oct-2017		



Details: Martin Dyer, Laboratory Manager

Project: Topsoil

Client: K.E. Lunness Aggregates Ltd	Chemtest Job No.:				17-27678	17-27678
Quotation No.:	Chemtest Sample ID.:				527718	527719
Order No.:	Client Sample Ref.:				(HH)	(BH)
	Client Sample ID.:				1	1
	Sample Type:				SOIL	SOIL
	Date Sampled:				17-Oct-2017	17-Oct-2017
	Asbestos Lab:				COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	11	11
pH	U	2010		N/A	7.3	7.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.56	0.52
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.023	0.027
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50	1.8	1.2
Arsenic	U	2450	mg/kg	1.0	5.3	4.1
Cadmium	U	2450	mg/kg	0.10	< 0.10	< 0.10
Chromium	U	2450	mg/kg	1.0	9.0	9.1
Copper	U	2450	mg/kg	0.50	19	18
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	< 0.50	< 0.50
Lead	U	2450	mg/kg	0.50	40	38
Selenium	U	2450	mg/kg	0.20	0.30	0.20
Zinc	U	2450	mg/kg	0.50	47	43
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[C] 2.5	[C] < 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[C] 66	[C] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[C] 69	[C] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[C] 16	[C] 12
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[C] 120	[C] 23
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[C] < 1.0	[C] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[C] 130	[C] 36
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[C] 200	[C] 36
Naphthalene	U	2700	mg/kg	0.10	< 0.10	0.67

Project: Topsoil

Client: K.E. Lunness Aggregates Ltd	Chemtest Job No.:				17-27678	17-27678
Quotation No.:	Chemtest Sample ID.:				527718	527719
Order No.:	Client Sample Ref.:				(HH)	(BH)
	Client Sample ID.:				1	1
	Sample Type:				SOIL	SOIL
	Date Sampled:				17-Oct-2017	17-Oct-2017
	Asbestos Lab:				COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	0.11
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	1.5	0.53
Anthracene	U	2700	mg/kg	0.10	0.36	0.10
Fluoranthene	U	2700	mg/kg	0.10	2.0	0.79
Pyrene	U	2700	mg/kg	0.10	1.9	0.81
Benzo[a]anthracene	U	2700	mg/kg	0.10	0.90	0.34
Chrysene	U	2700	mg/kg	0.10	0.93	0.34
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	1.1	0.53
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	0.37	0.27
Benzo[a]pyrene	U	2700	mg/kg	0.10	0.86	0.41
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	0.51	0.24
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	0.18	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	0.64	0.48
Total Of 16 PAH's	U	2700	mg/kg	2.0	11	5.6
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30

Deviations

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

Sample ID:	Sample Ref:	Sample ID:	Sampled Date:	Deviation Code(s):	Containers Received:
527718	(HH)	1	17-Oct-2017	C	Plastic Tub 500g
527719	(BH)	1	17-Oct-2017	C	Plastic Tub 500g

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

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

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

All Asbestos testing is performed at the indicated laboratory

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.co.uk

Chemtest Job No.: 17-14332
Chemtest Sample ID.: 464710

Client Sample Ref.: SP1

Client Sample ID.: 1

Top Depth (m):

Bottom Depth (m):

Date Sampled: 07-Jun-2017

Time Sampled:

Parameter	Units	Multipurpose Range	Result	Compliant with Multipurpose Range? (Y/N)	Compliant with Specific Purpose Range? (Y/N)		
Texture					Acid	Low F	Calc.
Clay content	%		11				
Silt content	%		16				
Sand content	%		73				
Soil texture class		See Attached Chart	Sandy Loam	YES			
Mass Loss on Ignition							
Clay 5-20%		3.0-20	3.0	YES	NO	YES	NO
Clay 20-35%		5.0-20					
Stone Content	% m/m						
>2mm		0-30	22	YES			
>20mm		0-10	< 0.020	YES			
>50mm		0	< 0.020	YES			
Soil pH value		5.5-8.5	7.8	YES	NO	YES	YES
Carbonate (Calcareous only)	%		< 0.10				NO
Electrical Conductivity	µS/cm	If >3300 do ESP	2200	YES			
Available Nutrient Content							
Nitrogen %		>0.15	0.19	YES	YES		YES
Extractable phosphorus	mg/l	16-140	46	YES	YES	NO	YES
Extractable potassium	mg/l	121-1500	150	YES	YES		YES
Extractable magnesium	mg/l	51-600	120	YES	YES		YES
Carbon : Nitrogen Ratio		<20:1	8.3/1	YES	YES	YES	YES
Exchangeable sodium	%	<15	0.68				
Available Calcium	mg/l		2500				
Available Sodium	mg/l		22				
Phytotoxic Contaminants (by soil pH)		< 6.0	6.0-7.0	> 7.0			
Zinc (Nitric Acid extract)	mg/kg	<200	<200	<300	54	YES	
Copper (Nitric Acid extract)	mg/kg	<100	<135	<200	16	YES	
Nickel (Nitric Acid extract)	mg/kg	<60	<75	<110	6.4	YES	
Visible Contaminants	% mm						
>2mm		<0.5	0.000	YES			
..... of which plastics		<0.25	0.000	YES			
..... man-made sharps		zero in 1kg	0.000	YES			

APPENDIX III

Validation Testing Results for Topsoil and Subsoil Materials (Following Emplacement)



ANALYTICAL TEST REPORT

Contract no: 70932
Contract name: Hill End Road, Mapplewell
Client reference: 18-194
Clients name: ARC Environmental
Clients address: Solum House, Unit 1 Elliott Court
St Johns Road, Meadowfield
DH7 8PN

Samples received: 28 March 2018

Analysis started: 28 March 2018

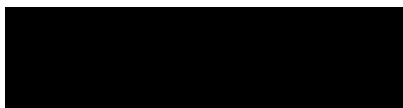
Analysis completed 09 April 2018

Report issued: 09 April 2018

Notes: Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key: U UKAS accredited test
M MCERTS & UKAS accredited test
\$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:



James Spittle
Customer Services Team Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
70932-1	Sample 1	-	Sand with Gravel	-	-	13.9
70932-2	Sample 2	-	Clayey Sand with Gravel	-	-	12.8

Chemtech Environmental Limited

SOILS

Lab number			70932-1	70932-2
Sample id			Sample 1	Sample 2
Depth (m)			-	-
Date sampled			27/03/2018	27/03/2018
Test	Method	Units		
Arsenic (total)	CE127 ^M	mg/kg As	5.4	5.2
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	0.2
Chromium (total)	CE127 ^M	mg/kg Cr	28	26
Chromium (III)	-	mg/kg CrIII	28	26
Chromium (VI)	CE146	mg/kg CrVI	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	8.7	14
Lead (total)	CE127 ^M	mg/kg Pb	14	16
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	12	10
Selenium (total)	CE127 ^M	mg/kg Se	<0.3	0.3
Zinc (total)	CE127 ^M	mg/kg Zn	37	47
pH	CE004 ^M	units	8.6	8.5
Sulphate (2:1 water soluble)	CE061 ^M	mg/l SO ₄	39	93
Cyanide (free)	CE077	mg/kg CN	<1	<1
Total Organic Carbon (TOC)	CE072 ^M	% w/w C	0.48	0.54
PAH				
Acenaphthene	CE087 ^M	mg/kg	<0.01	0.01
Acenaphthylene	CE087 ^M	mg/kg	<0.01	<0.01
Anthracene	CE087 ^U	mg/kg	0.02	<0.02
Benzo(a)anthracene	CE087 ^U	mg/kg	0.02	0.07
Benzo(a)pyrene	CE087 ^U	mg/kg	<0.02	<0.02
Benzo(b)fluoranthene	CE087 ^M	mg/kg	<0.02	0.03
Benzo(ghi)perylene	CE087 ^M	mg/kg	<0.02	<0.02
Benzo(k)fluoranthene	CE087 ^M	mg/kg	<0.02	<0.02
Chrysene	CE087 ^M	mg/kg	0.03	0.07
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	<0.02
Fluoranthene	CE087 ^M	mg/kg	0.04	0.13
Fluorene	CE087 ^U	mg/kg	<0.01	<0.01
Indeno(123cd)pyrene	CE087 ^M	mg/kg	<0.02	<0.02
Naphthalene	CE087 ^M	mg/kg	<0.01	<0.01
Phenanthrene	CE087 ^M	mg/kg	<0.02	0.06
Pyrene	CE087 ^M	mg/kg	0.05	0.14
PAH (total of USEPA 16)	CE087	mg/kg	<0.27	0.51
Benzo(j)fluoranthene	CE087	mg/kg	<0.02	<0.02
PAH (total of OIL 8)	CE087	mg/kg	<0.15	0.17
Subcontracted analysis				
Asbestos (qualitative)	\$	-	NAD	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
-	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO ₄
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	Wet		1	mg/kg CN
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE087	Acenaphthene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	Wet	U	0.01	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Naphthalene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	Wet		0.27	mg/kg
CE087	Benzo(j)fluoranthene	Solvent extraction, GC-MS	Wet		0.02	mg/kg
CE087	PAH (total of OIL 8)	Solvent extraction, GC-MS	Wet		0.15	mg/kg
\$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
70932-1	Sample 1	-	N	
70932-2	Sample 2	-	N	



ANALYTICAL TEST REPORT

Contract no: 71473
Contract name: Hill End Road, Mapplewell
Client reference: 18-194
Clients name: ARC Environmental
Clients address: Solum House, Unit 1 Elliott Court
St Johns Road
Meadowfield
DH7 8PN

Samples received: 27 April 2018

Analysis started: 24 April 2018

Analysis completed 04 May 2018

Report issued: 04 May 2018

Notes: Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key: U UKAS accredited test
M MCERTS & UKAS accredited test
\$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by: 
Dave Bowerbank
Customer Services Co-ordinator

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
71473-1	Plots 16-18	0.00-0.15	Loamy Sand with Gravel	-	-	10.7
71473-2	Plots 19-21	0.00-0.15	Loamy Sand with Gravel	-	-	9.7

Chemtech Environmental Limited

SOILS

Lab number			71473-1	71473-2
Sample id			Plots 16-18	Plots 19-21
Depth (m)			0.00-0.15	0.00-0.15
Date sampled			26/04/2018	26/04/2018
Test	Method	Units		
Arsenic (total)	CE127 ^M	mg/kg As	6.8	6.8
Cadmium (total)	CE127 ^M	mg/kg Cd	<0.2	<0.2
Chromium (total)	CE127 ^M	mg/kg Cr	89	92
Chromium (III)	-	mg/kg CrIII	89	92
Chromium (VI)	CE146	mg/kg CrVI	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	14	15
Lead (total)	CE127 ^M	mg/kg Pb	66	40
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	12	14
Selenium (total)	CE127 ^M	mg/kg Se	0.6	0.5
Zinc (total)	CE127 ^M	mg/kg Zn	52	45
pH	CE004 ^M	units	7.5	7.8
Sulphate (2:1 water soluble)	CE061 ^M	mg/l SO ₄	51	27
Cyanide (free)	CE077	mg/kg CN	<1	<1
Total Organic Carbon (TOC)	CE072 ^M	% w/w C	0.94	0.84
PAH				
Acenaphthene	CE087 ^M	mg/kg	<0.01	<0.01
Acenaphthylene	CE087 ^M	mg/kg	<0.01	<0.01
Anthracene	CE087 ^U	mg/kg	0.04	0.04
Benzo(a)anthracene	CE087 ^U	mg/kg	0.12	0.17
Benzo(a)pyrene	CE087 ^U	mg/kg	0.17	0.17
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.22	0.21
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.11	0.10
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.03	0.10
Chrysene	CE087 ^M	mg/kg	0.17	0.16
Dibenz(ah)anthracene	CE087 ^M	mg/kg	<0.02	<0.02
Fluoranthene	CE087 ^M	mg/kg	0.28	0.28
Fluorene	CE087 ^U	mg/kg	<0.01	<0.01
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.11	0.09
Naphthalene	CE087 ^M	mg/kg	<0.01	<0.01
Phenanthrene	CE087 ^M	mg/kg	0.10	0.10
Pyrene	CE087 ^M	mg/kg	0.27	0.27
PAH (total of USEPA 16)	CE087	mg/kg	1.61	1.68
Benzo(j)fluoranthene	CE087	mg/kg	<0.02	0.03
PAH (total of OIL 8)	CE087	mg/kg	0.82	0.93
Subcontracted analysis				
Asbestos (qualitative)	\$	-	NAD	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
-	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO ₄
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	Wet		1	mg/kg CN
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE087	Acenaphthene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	Wet	U	0.01	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Naphthalene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	Wet		0.27	mg/kg
CE087	Benzo(j)fluoranthene	Solvent extraction, GC-MS	Wet		0.02	mg/kg
CE087	PAH (total of OIL 8)	Solvent extraction, GC-MS	Wet		0.15	mg/kg
\$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
71473-1	Plots 16-18	0.00-0.15	N	
71473-2	Plots 19-21	0.00-0.15	N	



ANALYTICAL TEST REPORT

Contract no: 79125
Contract name: Hill End Road, Maplewell
Client reference: 18-194
Clients name: ARC Environmental
Clients address: Solum House, Unit 1 Elliott Court
St Johns Road
Meadowfield
DH7 8PN

Samples received: 03 June 2019

Analysis started: 03 June 2019

Analysis completed: 10 June 2019

Report issued: 10 June 2019

Notes: Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key: U UKAS accredited test
M MCERTS & UKAS accredited test
\$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:



Karan Campbell
Director

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
79125-1	Plot 3 - Topsoil	0.10	Sand with Gravel	-	-	8.8
79125-2	Plot 3 - Subsoil	0.60	Sand with Gravel	-	-	9.6
79125-3	Plot 6 - Topsoil	0.10	Clayey Sand with Gravel	-	-	14.3
79125-4	Plot 6 - Subsoil	0.50	Clayey Sand with Gravel	-	-	13.2
79125-5	Plot 9 - Topsoil	0.10	Clayey Sand with Gravel	-	-	15.3
79125-6	Plot 9 - Subsoil	0.60	Clayey Sand with Gravel	-	-	15.4
79125-7	Plot 10 - Topsoil	0.10	Clayey Sand with Gravel & Roots	-	-	12.1
79125-8	Plot 10 - Subsoil	0.50	Clayey Sand with Gravel & Roots	-	-	11.1
79125-9	Plot 15 - Topsoil	0.20	Sand with Gravel & Roots	-	-	10.1
79125-10	Plot 15 - Subsoil	0.60	Sandy Clay with Gravel & Roots	-	-	15.7
79125-11	Plot 22 - Topsoil	0.20	Sand with Gravel & Roots	-	-	10.3
79125-12	Plot 22 - Subsoil	0.60	Clayey Sand with Gravel	-	-	14.5
79125-13	Plot 25 - Topsoil	0.10	Sand with Gravel	-	-	10.6
79125-14	Plot 25 - Subsoil	0.50	Sand with Gravel	-	-	11.8

Chemtech Environmental Limited

SOILS

Lab number			79125-1	79125-2	79125-3	79125-4	79125-5	79125-6
Sample id			Plot 3 - Topsoil	Plot 3 - Subsoil	Plot 6 - Topsoil	Plot 6 - Subsoil	Plot 9 - Topsoil	Plot 9 - Subsoil
Depth (m)			0.10	0.60	0.10	0.50	0.10	0.60
Date sampled			31/05/2019	31/05/2019	31/05/2019	31/05/2019	31/05/2019	31/05/2019
Test	Method	Units						
Arsenic (total)	CE127 ^M	mg/kg As	11	9.5	17	14	8.6	10
Cadmium (total)	CE127 ^M	mg/kg Cd	0.6	0.4	0.3	0.5	0.2	<0.2
Chromium (total)	CE127 ^M	mg/kg Cr	43	43	36	49	33	34
Chromium (III)	-	mg/kg CrIII	43	43	36	49	33	34
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	31	24	112	33	21	22
Lead (total)	CE127 ^M	mg/kg Pb	75	51	47	58	33	34
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	17	18	22	21	11	13
Selenium (total)	CE127 ^M	mg/kg Se	0.8	0.7	0.9	0.9	0.5	0.6
Zinc (total)	CE127 ^M	mg/kg Zn	103	88	94	118	55	57
pH	CE004 ^M	units	7.6	7.6	7.6	7.7	7.7	7.7
Sulphate (2:1 water soluble)	CE049 ^U	mg/l SO ₄	855	602	131	332	72	68
Cyanide (free)	CE077	mg/kg CN	<1	<1	<1	<1	<1	<1
Total Organic Carbon (TOC)	CE072 ^M	% w/w C	2.3	2.5	7.2	3.9	3.1	3.6
PAH								
Acenaphthene	CE087 ^M	mg/kg	0.12	0.19	0.05	0.19	0.03	0.61
Acenaphthylene	CE087 ^M	mg/kg	0.26	0.06	<0.02	0.05	<0.02	<0.02
Anthracene	CE087 ^U	mg/kg	0.55	0.80	0.18	0.54	0.10	1.01
Benzo(a)anthracene	CE087 ^U	mg/kg	2.87	1.97	0.62	1.25	0.30	1.32
Benzo(a)pyrene	CE087 ^U	mg/kg	2.91	1.95	0.69	1.25	0.31	1.19
Benzo(b)fluoranthene	CE087 ^M	mg/kg	3.79	2.52	0.85	1.60	0.42	1.47
Benzo(ghi)perylene	CE087 ^M	mg/kg	1.79	1.24	0.44	0.79	0.17	0.72
Benzo(k)fluoranthene	CE087 ^M	mg/kg	1.60	1.04	0.38	0.64	0.15	0.65
Chrysene	CE087 ^M	mg/kg	2.94	2.07	0.70	1.30	0.34	1.41
Dibenz(ah)anthracene	CE087 ^M	mg/kg	0.47	0.32	0.11	0.19	0.05	0.18
Fluoranthene	CE087 ^M	mg/kg	5.84	4.82	1.29	2.88	0.66	3.68
Fluorene	CE087 ^U	mg/kg	0.13	0.26	0.04	0.20	0.03	0.49
Indeno(123cd)pyrene	CE087 ^M	mg/kg	1.91	1.29	0.45	0.82	0.21	0.77
Naphthalene	CE087 ^M	mg/kg	0.16	0.16	0.10	0.36	0.10	0.16
Phenanthrene	CE087 ^M	mg/kg	1.86	3.55	0.51	1.91	0.34	3.98
Pyrene	CE087 ^M	mg/kg	4.86	4.13	1.14	2.53	0.57	2.98
PAH (total of USEPA 16)	CE087	mg/kg	32.1	26.4	7.55	16.5	3.78	20.6
Benzo(j)fluoranthene	CE087	mg/kg	0.53	0.35	0.13	0.21	0.05	0.22
PAH (total of OIL 8)	CE087	mg/kg	17.0	11.5	3.92	7.26	1.84	7.20
Subcontracted analysis								
Asbestos (qualitative)	\$	-	NAD	NAD	NAD	NAD	NAD	NAD

Chemtech Environmental Limited

SOILS

Lab number			79125-7	79125-8	79125-9	79125-10	79125-11	79125-12
Sample id			Plot 10 - Topsoil	Plot 10 - Subsoil	Plot 15 - Topsoil	Plot 15 - Subsoil	Plot 22 - Topsoil	Plot 22 - Subsoil
Depth (m)			0.10	0.50	0.20	0.60	0.20	0.60
Date sampled			31/05/2019	31/05/2019	31/05/2019	31/05/2019	31/05/2019	31/05/2019
Test	Method	Units						
Arsenic (total)	CE127 ^M	mg/kg As	5.8	7.2	6.4	8.8	11	11
Cadmium (total)	CE127 ^M	mg/kg Cd	0.2	0.2	<0.2	0.4	0.4	0.4
Chromium (total)	CE127 ^M	mg/kg Cr	128	33	28	105	45	55
Chromium (III)	-	mg/kg CrIII	128	33	28	105	45	55
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	20	18	8.8	41	25	24
Lead (total)	CE127 ^M	mg/kg Pb	28	48	237	48	54	65
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	87	10	6.2	14	20	18
Selenium (total)	CE127 ^M	mg/kg Se	0.4	0.5	0.4	0.6	0.8	0.8
Zinc (total)	CE127 ^M	mg/kg Zn	49	60	34	88	106	96
pH	CE004 ^M	units	8.6	8.4	8.3	8.4	8.2	7.9
Sulphate (2:1 water soluble)	CE049 ^U	mg/l SO ₄	105	296	34	108	232	171
Cyanide (free)	CE077	mg/kg CN	<1	<1	<1	<1	<1	<1
Total Organic Carbon (TOC)	CE072 ^M	% w/w C	0.7	1.0	1.4	2.4	1.9	3.1
PAH								
Acenaphthene	CE087 ^M	mg/kg	0.07	<0.02	0.02	0.10	0.20	0.10
Acenaphthylene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02	0.04	<0.02	<0.02
Anthracene	CE087 ^U	mg/kg	0.33	0.08	0.16	0.35	0.54	0.73
Benzo(a)anthracene	CE087 ^U	mg/kg	0.78	0.45	0.52	1.67	1.50	1.65
Benzo(a)pyrene	CE087 ^U	mg/kg	0.65	0.50	0.46	2.08	1.58	1.59
Benzo(b)fluoranthene	CE087 ^M	mg/kg	0.91	0.64	0.66	2.61	2.10	2.07
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.41	0.31	0.27	1.49	1.08	1.04
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.37	0.27	0.29	1.08	0.81	0.88
Chrysene	CE087 ^M	mg/kg	0.74	0.50	0.55	1.87	1.74	1.77
Dibenz(ah)anthracene	CE087 ^M	mg/kg	0.11	0.08	0.07	0.35	0.25	0.24
Fluoranthene	CE087 ^M	mg/kg	2.14	0.87	1.18	3.24	3.99	4.61
Fluorene	CE087 ^U	mg/kg	0.06	<0.02	<0.02	0.08	0.15	0.14
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.45	0.36	0.33	1.49	1.08	1.08
Naphthalene	CE087 ^M	mg/kg	<0.02	<0.02	<0.02	0.08	0.04	0.04
Phenanthrene	CE087 ^M	mg/kg	1.01	0.24	0.68	0.99	2.29	2.86
Pyrene	CE087 ^M	mg/kg	1.78	0.78	0.98	3.06	3.41	3.79
PAH (total of USEPA 16)	CE087	mg/kg	9.81	5.08	6.17	20.6	20.7	22.6
Benzo(j)fluoranthene	CE087	mg/kg	0.12	0.09	0.10	0.36	0.27	0.29
PAH (total of OIL 8)	CE087	mg/kg	4.13	2.88	2.98	11.5	9.32	9.58
Subcontracted analysis								
Asbestos (qualitative)	\$	-	NAD	NAD	NAD	NAD	NAD	NAD

Chemtech Environmental Limited

SOILS

Lab number			79125-13	79125-14
Sample id			Plot 25 - Topsoil	Plot 25 - Subsoil
Depth (m)			0.10	0.50
Date sampled			31/05/2019	31/05/2019
Test	Method	Units		
Arsenic (total)	CE127 ^M	mg/kg As	10	8.9
Cadmium (total)	CE127 ^M	mg/kg Cd	0.3	0.4
Chromium (total)	CE127 ^M	mg/kg Cr	40	37
Chromium (III)	-	mg/kg CrIII	40	37
Chromium (VI)	CE146	mg/kg CrVI	<1	<1
Copper (total)	CE127 ^M	mg/kg Cu	21	20
Lead (total)	CE127 ^M	mg/kg Pb	34	40
Mercury (total)	CE127 ^M	mg/kg Hg	<0.5	<0.5
Nickel (total)	CE127 ^M	mg/kg Ni	17	17
Selenium (total)	CE127 ^M	mg/kg Se	0.6	0.7
Zinc (total)	CE127 ^M	mg/kg Zn	77	84
pH	CE004 ^M	units	8.5	8.4
Sulphate (2:1 water soluble)	CE049 ^U	mg/l SO ₄	281	201
Cyanide (free)	CE077	mg/kg CN	<1	<1
Total Organic Carbon (TOC)	CE072 ^M	% w/w C	2.2	3.0
PAH				
Acenaphthene	CE087 ^M	mg/kg	0.12	0.18
Acenaphthylene	CE087 ^M	mg/kg	<0.02	0.04
Anthracene	CE087 ^U	mg/kg	0.35	0.60
Benzo(a)anthracene	CE087 ^U	mg/kg	0.92	2.04
Benzo(a)pyrene	CE087 ^U	mg/kg	1.02	1.84
Benzo(b)fluoranthene	CE087 ^M	mg/kg	1.30	2.33
Benzo(ghi)perylene	CE087 ^M	mg/kg	0.70	1.10
Benzo(k)fluoranthene	CE087 ^M	mg/kg	0.53	1.03
Chrysene	CE087 ^M	mg/kg	1.01	2.04
Dibenz(ah)anthracene	CE087 ^M	mg/kg	0.16	0.28
Fluoranthene	CE087 ^M	mg/kg	2.16	5.45
Fluorene	CE087 ^U	mg/kg	0.12	0.13
Indeno(123cd)pyrene	CE087 ^M	mg/kg	0.72	1.19
Naphthalene	CE087 ^M	mg/kg	0.07	0.11
Phenanthrene	CE087 ^M	mg/kg	1.28	1.73
Pyrene	CE087 ^M	mg/kg	1.84	4.64
PAH (total of USEPA 16)	CE087	mg/kg	12.3	24.7
Benzo(j)fluoranthene	CE087	mg/kg	0.18	0.34
PAH (total of OIL 8)	CE087	mg/kg	5.86	11.1
Subcontracted analysis				
Asbestos (qualitative)	\$	-	NAD	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
-	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE049	Sulphate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	10	mg/l SO ₄
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE087	Benzo(j)fluoranthene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	PAH (total of OIL 8)	Solvent extraction, GC-MS	As received		0.18	mg/kg
\$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

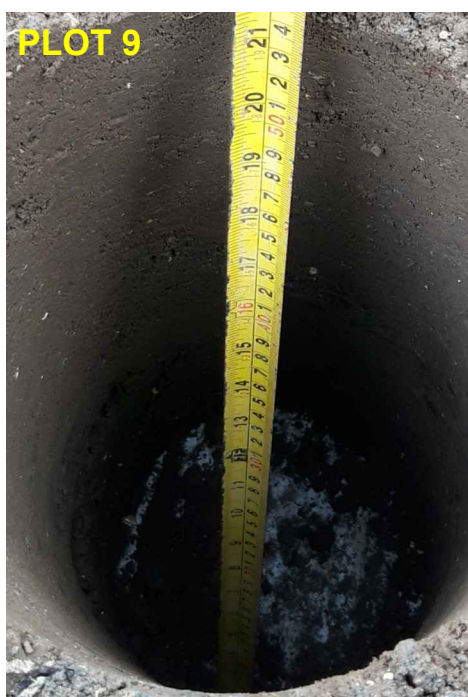
Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
79125-1	Plot 3 - Topsoil	0.10	N	
79125-2	Plot 3 - Subsoil	0.60	N	
79125-3	Plot 6 - Topsoil	0.10	N	
79125-4	Plot 6 - Subsoil	0.50	N	
79125-5	Plot 9 - Topsoil	0.10	N	
79125-6	Plot 9 - Subsoil	0.60	N	
79125-7	Plot 10 - Topsoil	0.10	N	
79125-8	Plot 10 - Subsoil	0.50	N	
79125-9	Plot 15 - Topsoil	0.20	N	
79125-10	Plot 15 - Subsoil	0.60	N	
79125-11	Plot 22 - Topsoil	0.20	N	
79125-12	Plot 22 - Subsoil	0.60	N	
79125-13	Plot 25 - Topsoil	0.10	N	
79125-14	Plot 25 - Subsoil	0.50	N	

APPENDIX IV

Photographic Record Sheets



ARC ENVIRONMENTAL LTD

Solum House
Unit 1 Elliott Court
St. John's Road
Meadowfield
Durham, DH7 8PN
Tel: (0191) 378 6380
Fax: (0191) 378 0494
e-mail: admin@arc-environmental.com
web: www.arc-environmental.com

The contractor shall check all dimensions on site before commencement of any works. No dimensions to be scaled off this drawing.
© Copyright Reserved

rev.	date	amendments	drawn	chkd

Client:
ESH CONSTRUCTION

Project Title:
Residential Development
Hill End Road
Mapplewell, S75 6DX

Drawing Title:
Clean Cover Validation
Photographic Record Sheet 1

Scale at A3: NTS @ A3	Date: 27.06.19	Drawn by: P.D	Approved by: M.P.B
--------------------------	-------------------	------------------	-----------------------

Job Ref: 18-194	Drg no: —	Rev: —
--------------------	--------------	-----------

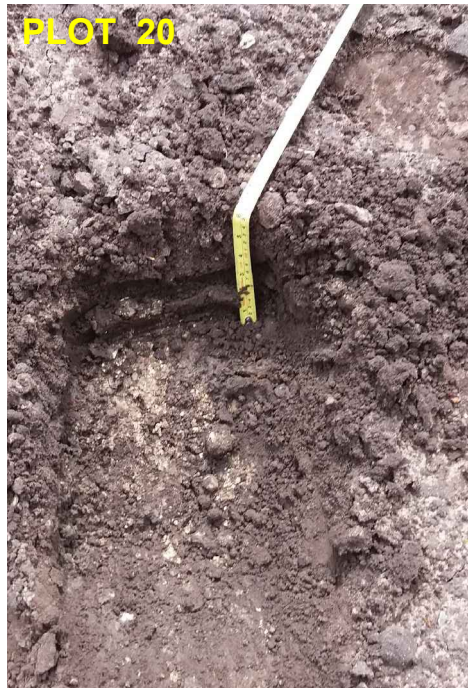
PLOT 20 - SUB SOIL EMPLACEMENT



PLOT 20



PLOT 20



PLOT 22



PLOT 22



PLOT 25



PLOT 25



ARC ENVIRONMENTAL LTD

Solum House
Unit 1 Elliott Court
St. John's Road
Meadowfield
Durham, DH7 8PN
Tel: (0191) 378 6380
Fax: (0191) 378 0494
e-mail: admin@arc-environmental.com
web: www.arc-environmental.com

The contractor shall check all dimensions on site before commencement of any works. No dimensions to be scaled off this drawing.
© Copyright Reserved

rev.	date	amendments	drawn	chckd

Client:
ESH CONSTRUCTION

Project Title:
Residential Development
Hill End Road
Mapplewell, S75 6DX

Drawing Title:
Clean Cover Validation
Photographic Record Sheet 2

Scale at A3: NTS @ A3	Date: 27.06.19	Drawn by: P.D	Approved by: M.P.B
--------------------------	-------------------	------------------	-----------------------

Job Ref: 18-194	Drg no: —	Rev: —
--------------------	--------------	-----------