SUPPLEMENTARY REMEDIATION METHOD STATEMENT
For
GEDA CONSTRUCTION LIMITED
On a Site at
STATION ROAD, LONG SUTTON, SPALDING, LINCOLNSHIRE

Reference	Revision	Project Director	Issue Date
MJH/J2011/D1/1	First	Marcus Hanford	29th September 2021
MJH/J2011/D1/2	Second: Increase of capping soil thickness to 0.9m and consideration of latest YALPAG guidance.	Marcus Hanford	1st October 2021
MJH/J2011/D1/3	Text of Section 3.1.6 amended to confirm testing for asbestos.	Marcus Hanford	14th October 2021

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1.0 INTRODUCTION

1.1 This report describes the proposed supplementary geo-environmental remediation of a site at Station Road, Long Sutton, Lincolnshire.

1.2 This report has been produced on behalf of the Client, Geda Construction and no responsibility is accepted to any third party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of Emcus Limited. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill.

1.3 The site plans and drawings enclosed in this report should not be scaled off.

2.0 BACKGROUND

2.1 The site is located on the northern side of Station Road, Long Sutton, Spalding, Lincolnshire. The Ordnance Survey Grid Reference for the approximate centre of the site is TF 428229.

2.2 Our Client has advised that during their re-development of the site, granular material placed as a temporary haul road for site traffic was inadvertently left in place beneath the rear gardens of the plots in the eastern area of the site (Plots 1 – 19) and subsequently buried beneath a cover of topsoil. We understand that granular haul road material and topsoil was placed after ground levels in that area had been reduced by approximately 0.9m to accord with the requirements of the remediation method statement for the site prepared by Ground Engineering, (report reference C13684B1, dated May 2019).

2.3 We have been provided with the logs of 5 hand dug trial pits (HDTP01 – 05) excavated by Delta Simons on 14th July 2021 to investigate the materials in the rear gardens of Plots 1 – 19 and results of chemical laboratory analyses undertaken on the haul road materials and overlying topsoil. The logs of the trial pits, a drawing showing their approximate locations and laboratory test results are presented in Appendix A. (A 6th trial pit HDTP201 was also excavated in the western area of the site). The provided Delta Simons information did not, however, include any interpretation / geo-environmental assessment of the results, or recommendations.

2.4 The hand dug trial pits HDTP01 – 05 which were excavated by Delta Simons indicate that brown silty topsoil with occasional fragments of brick and concrete was generally encountered in the rear gardens of Plots 1-19 to depths of 0.09m – 0.26m bgl. The topsoil is reported to be generally underlain by Made Ground comprising brown sand fill incorporating varying proportions of concrete, brick, tile flint and metal. The Made Ground extended beyond the bottom of the trial pits and is understood to represent material from the haul road.

2.5 10 samples recovered from the trial pits (5 samples of topsoil and 5 samples of Made Ground) are indicated to have been sent to the UKAS and MCERTS laboratory of i2 Analytical for chemical contamination analyses. The analyses undertaken on the samples is reported to have comprised a general contamination screening suite, speciated poly aromatic hydrocarbons, speciated total petroleum hydrocarbons, BTEX and asbestos.

2.6 The results of the provided chemical contamination testing have generally been assessed with reference to the published Soil Guideline Values (SGVs) and Category 4 Screening Levels (C4SLs). In the absence of published SGVs / C4SLs, the results of the chemical contamination analyses have been assessed with reference to other available assessment guidelines, including Land Quality Management / Chartered Institute of Environmental Health (LQM/CIEH) assessment criteria. (The provided laboratory test results do not include any determination of the organic matter content of the samples analysed. As such a soil organic matter content of 1% has been assumed for the purpose of assessing the results).

2.7 The results of the chemical analyses indicate the topsoil beneath the rear gardens of plots 1 – 19 is free of significant contamination, with all the determinands tested for in that strata revealing concentrations, falling either below the levels of detection or below their respective assessment criteria for a residential (with private garden) end use.

2.8 However, elevated concentrations of Poly Aromatic Hydrocarbons have been revealed in the Made Ground beneath the rear gardens of Plots 1 – 19, summarised as follows.

Benzo(a)anthracene - The samples of Made Ground from HDTP04 at 0.3m – 0.5m bgl., and HDTP05 at 0.3m – 0.45m bgl., revealed Benzo(a)anthracene concentrations of 3.9mg/kg (HDTP04) and 7.2mg/kg (HDTP05) which exceed the respective Land Quality Management / Chartered Institute of Environmental Health (LQM/CIEH) assessment criteria of 3.1mg/kg.

Benzo(b)fluoranthene - The sample of Made Ground from HDTP05 at 0.3m – 0.45m bgl., revealed a Benzo(a)fluoranthene concentration of 6mg/kg which exceeds the respective Land Quality Management / Chartered Institute of Environmental Health (LQM/CIEH) assessment criteria of 5.6mg/kg.

Benzo(a)pyrene - The samples of Made Ground from HDTP04 at 0.3m – 0.5m bgl., and HDTP05 at 0.3m – 0.45m bgl., revealed Benzo(a)pyrene concentrations of 3.4mg/kg (HDTP04) and 6.6mg/kg (HDTP05) which exceeds the respective C4SL of 2.4mg/kg.

Dibenz(a,h)anthracene - The sample of Made Ground from HDTP05 at 0.3m – 0.45m bgl., revealed a Dibenz(a,h)anthracene concentration of 0.92mg/kg which exceeds the respective Land Quality Management / Chartered Institute of Environmental Health (LQM/CIEH) assessment criteria of assessment of 0.76mg/kg

2.9 Furthermore, asbestos (0.9% chrysotile) was revealed in the sample of Made Ground analysed from HDTP02 at 0.1m – 0.27m bgl.

3.0 PROPOSED REMEDIATION

3.1 Soils

3.1.1 It is considered that the asbestos and concentrations of Poly Aromatic Hydrocarbons (PaH) revealed by the Delta Simon investigation render the Made Ground / haul road material unsuitable to remain in-situ at shallow depth in the rear gardens of the residential houses. As such, it is recommended that the Made Ground / haul road materials are sufficiently excavated from the proposed gardens of Plots 1 - 19 to allow the placement of a simple cover system, comprising a minimum 0.9m deep cover of chemically suitable subsoil and topsoil. It is considered that cover system will provide an effective break in the contamination source to receptor pathway and prevent the asbestos and elevated concentrations of PaH in the underlying Made Ground from posing a significant risk to end users in the private gardens.

3.1.2 Within the rear gardens of Plots 1 – 19 and following the removal of any sheds / playhouses and fences etc., the topsoil shall be stripped and the Made Ground / haul road materials sufficiently excavated to a level 0.9m below finished ground levels. It is considered that providing the topsoil is stripped carefully it can be retained for re-use on the site, subject to the results of appropriate chemical testing. The Made Ground / haul road materials excavated from the site should be disposed of at a suitably licensed waste management facility.

3.1.3 Once the Made Ground / haul road materials have been stripped, a level survey of the gardens shall be undertaken by the Contractor (including survey points in the centre and around the margins of each garden) and the area inspected by a geo-environmental engineer from Emcus Limited.

3.1.4 Once the Made Ground has been confirmed as being sufficiently excavated, a cover system comprising 0.7m – 0.75m of chemically suitable subsoil and 0.15m - 0.2m of chemically suitable topsoil shall be placed above the remaining Made Ground in the rear gardens of Plots 1 – 19. The latter could include any topsoil which has was stripped carefully from the rear gardens, prior to the excavation of the Made Ground / haul road materials.

3.1.5 The subsoil and topsoil (including that stripped before the excavation of the Made Ground / haul road materials) shall be confirmed as being chemically suitable by appropriate laboratory analyses at an appropriate UKAS & MCERTS accredited laboratory, prior to placement in the gardens.

3.1.6 Any additional topsoil and / or subsoil imported on site shall be sourced from a greenfield site and / or comprise a manufactured product. For soils imported onto site and topsoil stripped from the gardens before excavation of the Made Ground / haul road materials, the laboratory analyses shall be undertaken at a frequency of one sample for every 250 cubic metres of material required, with a minimum of 3 samples analysed from each material source. (In this context, the topsoil stripped from the gardens before excavation of the Made Ground / haul road materials shall be considered a ‘source’). The laboratory analyses shall as a minimum comprise a General Screening Suite, asbestos and USEPA

16 speciated Poly Aromatic Hydrocarbons. A list of the individual determinands to be tested for within the General Screening Suite, asbestos, USEPA 16 speciated Poly Aromatic Hydrocarbons and the respective soil target values (maximum target concentrations), are presented in Appendix B of this report. Topsoil / subsoil with any determinand concentrations greater than the target values shall not be used.

3.1.7 Following placement of the capping soils, a level survey of the gardens shall be undertaken by the Contractor. The results of that survey shall be compared to those from the survey undertaken immediately following excavation of the Made Ground / haul road materials to confirm a minimum 0.9m thick capping is present.

3.1.8 If during the proposed remediation works, any visual or olfactory evidence of contamination is encountered, then further advice from a suitably qualified and experienced Geo-Environmental Engineer should be sought. Remediation in the area of any identified contamination shall not recommence until an updated remediation strategy has been agreed with the Local Authority.

3.1.9 The remediation works shall be undertaken by a suitably licenced and experienced Contractor.

3.1.10 Asbestos has been identified in the Made Ground beneath the site. As such, the Made Ground shall be sufficiently dampened during the remediation to minimise the generation of dust and air-borne particles, potentially including asbestos fibres, etc.

4.0 VALIDATION

4.1 Validation Works Completion Report

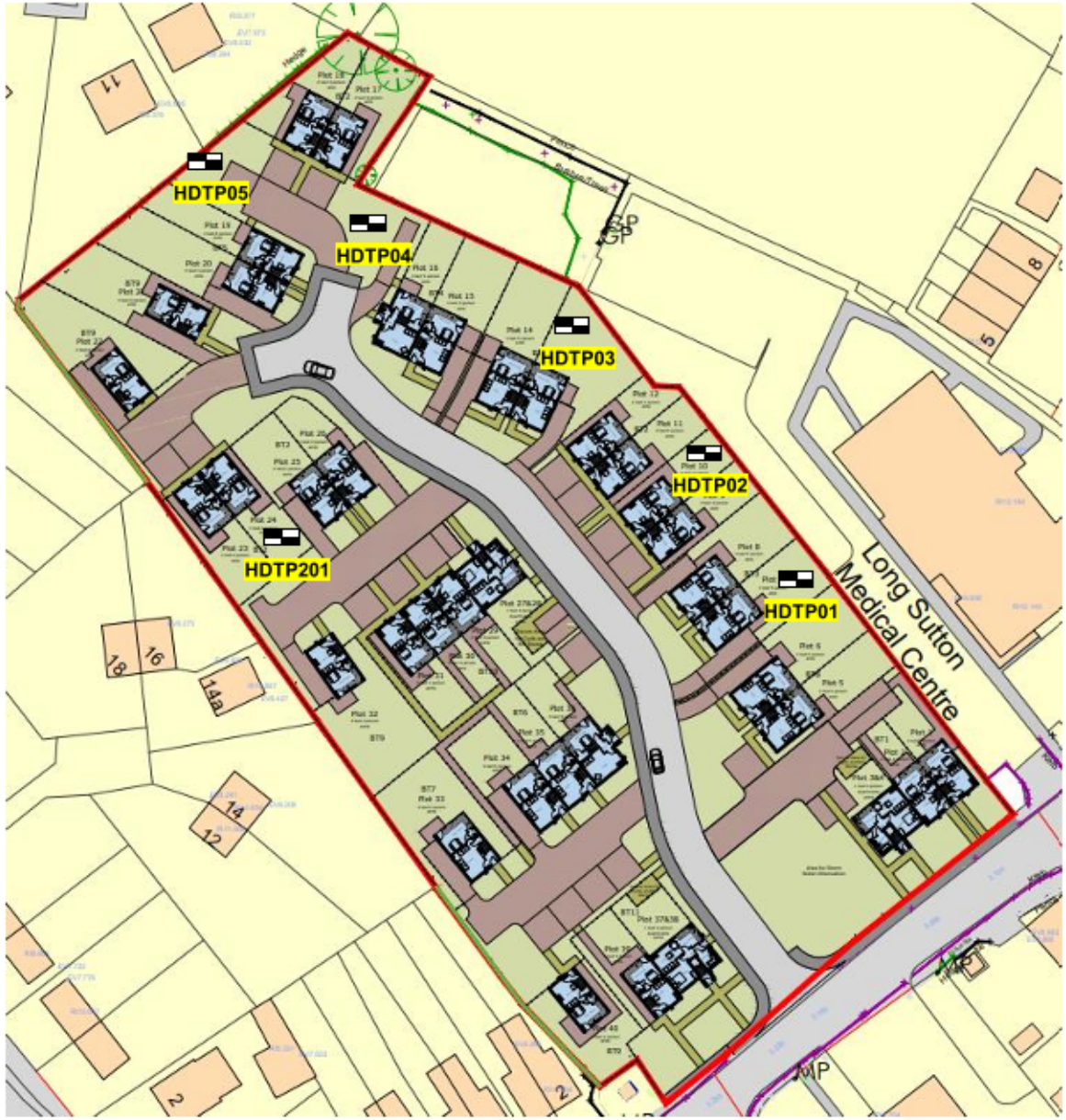
4.1.1 A remediation works completion report shall be prepared by Emcus Limited for submission to the Local Authority, etc. That works completion report shall include:

- Copies of the waste transfer notes confirming the appropriate off-site disposal of the Made Ground / haul road materials excavated from the site.
- Copies of the level surveys in the rear gardens following the excavation of the Made Ground / haul road materials and after placement of the subsoil / topsoil.
- Records of site inspections by the geo-environmental engineer, including photographs as appropriate.
- Details of the topsoil / subsoil source and the results of the chemical laboratory analyses undertaken on the topsoil / subsoil to be used in the gardens.
- Transfer tickets confirming importation of subsoil / topsoil from the approved source.

APPENDICES

Appendix A

Delta Simons Trial Pits Logs, Location Drawing & Chemical Test Results



Baseplan provided by the client.

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TITLE:
Approximate Hand Pit Location Plan
Long Sutton

DRAWN BY:	SCALE:	PROJECT NO:
MBP	NTS	21-0536.01
CHECKED BY:	REVISION:	FIGURE NO:
GT	-	1
DATE: 16th September 2021		

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Project No:	Hole ID:	Page:
21-0536.01	HDTP01	1 of 1

Project: **Land off Station Road, Long Sutton**

Hand Dug Trial Pit Log

Date: **14/07/2021**

Client: **GEDA Construction**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details: Depth (m)	Sample Details: Type & Ref	Test Details: Depth (m)	Test Details: Results
Dark brown silty fine to medium SAND with occasional gravel and fine rootlets. Gravel is fine to coarse subangular to rounded concrete, brick fragments and flint. (TOPSOIL).		0.26			0.10 - 0.26	ES1		
MADE GROUND: Brown slightly gravelly silty fine to medium SAND. Gravel is fine to cobble sized subangular to rounded concrete, brick fragments and flint.		0.38			0.30 - 0.38	ES2		
Hand pit complete at 0.38 m bgl.								

Dimensions and Orientation:



Bearing:

Inclination:

Remarks:
1. Logged in general accordance to BS 5930:2015+A1:2020.2. Hand pit terminated at 0.38 m bgl due to dense Made Ground.3. Backfilled with arisings.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		GEDA	Hand Tools	MBP	GT	GT	1:30

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Project No:	Hole ID:	Page:
21-0536.01	HDTP02	1 of 1

Project: **Land off Station Road, Long Sutton**

Hand Dug Trial Pit Log

Date: **14/07/2021**

Client: **GEDA Construction**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details		Test Details	
					Depth (m)	Type & Ref	Depth (m)	Results
Dark brown silty fine to medium SAND with occasional gravel and fine rootlets. Gravel is fine to coarse subangular to rounded concrete, brick fragments and flint. (TOPSOIL).		0.24			0.10 - 0.24	ES1		
MADE GROUND: Brown slightly gravelly silty fine to medium SAND. Gravel is fine to cobble sized subangular to rounded concrete, brick fragments and flint.		0.40			0.30 - 0.40	ES2		
Hand pit complete at 0.40 m bgl.								

Dimensions and Orientation:



Bearing:

Inclination:

Remarks:
1. Logged in general accordance to BS 5930:2015+A1:2020.2. Hand pit terminated at 0.40 m bgl due to dense Made Ground.3. Backfilled with arisings.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		GEDA	Hand Tools	MBP	GT	GT	1:30

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21-0536.01	HDTP03	1 of 1

Project: **Land off Station Road, Long Sutton**

Hand Dug Trial Pit Log

Date: **14/07/2021**

Client: **GEDA Construction**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details		Test Details	
					Depth (m)	Type & Ref	Depth (m)	Results
Dark brown silty fine to medium SAND with occasional gravel and fine rootlets. Gravel is fine to coarse subangular to rounded concrete, brick fragments and flint. (TOPSOIL).		0.09			0.00 - 0.09 0.10 - 0.27	ES1 ES2		
MADE GROUND: Brown slightly gravelly silty fine to medium SAND. Gravel is fine to cobble sized subangular to rounded concrete, brick fragments and flint.		0.27						
Hand pit complete at 0.27 m bgl.								

Dimensions and Orientation:



Bearing:

Inclination:

Remarks:
1. Logged in general accordance to BS 5930:2015+A1:2020.2. Hand pit terminated at 0.27 m bgl due to dense Made Ground.3. Backfilled with arisings.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		GEDA	Hand Tools	MBP	GT	GT	1:30

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Project No:	Hole ID:	Page:
21-0536.01	HDTP04	1 of 1

Project: **Land off Station Road, Long Sutton**

Hand Dug Trial Pit Log

Date: **14/07/2021**

Client: **GEDA Construction**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details		Test Details	
					Depth (m)	Type & Ref	Depth (m)	Results
Dark brown silty fine to medium SAND with occasional gravel and fine rootlets. Gravel is fine to medium subangular to rounded concrete, brick fragments and flint. (TOPSOIL).		0.26			0.10 - 0.26	ES1		
MADE GROUND: Brown slightly gravelly silty fine to medium SAND. Gravel is fine to cobble sized subangular to rounded concrete, brick fragments, occasional tile and flint.		0.50			0.30 - 0.50	ES2		
Hand pit complete at 0.50 m bgl.								

Dimensions and Orientation:



Bearing:

Inclination:

Remarks:
1. Logged in general accordance to BS 5930:2015+A1:2020.2. Hand pit terminated at 0.50 m bgl due to dense Made Ground.3. Backfilled with arisings.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		GEDA	Hand Tools	MBP	GT	GT	1:30

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Project No:	Hole ID:	Page:
21-0536.01	HDTP05	1 of 1

Project: **Land off Station Road, Long Sutton**

Hand Dug Trial Pit Log

Date: **14/07/2021**

Client: **GEDA Construction**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details		Test Details	
					Depth (m)	Type & Ref	Depth (m)	Results
Dark brown silty fine to medium SAND with occasional gravel and fine rootlets. Gravel is fine to medium subangular to rounded concrete, brick fragments and flint. (TOPSOIL).		0.25			0.10 - 0.25	ES1		
MADE GROUND: Brown slightly gravelly silty fine to medium SAND. Gravel is fine to medium subangular concrete and flint with rare metal at 0.35m.		0.45			0.30 - 0.45	ES2		
Hand pit complete at 0.45 m bgl.								

Dimensions and Orientation:



Bearing:

Inclination:

Remarks:
1. Logged in general accordance to BS 5930:2015+A1:2020.2. Hand pit terminated at 0.45 m bgl due to dense Made Ground.3. Backfilled with arisings.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		GEDA	Hand Tools	MBP	GT	GT	1:30

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Project No:	Hole ID:	Page:
21-0536.01	HDTP201	1 of 1

Project: **Land off Station Road, Long Sutton**

Hand Dug Trial Pit Log

Date: **02/09/2021** | Client: **GEDA Construction**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details: Depth (m)	Sample Details: Type & Ref	Test Details: Depth (m)	Test Details: Results
Brown silty fine to medium SAND with occasional gravel. Gravel is fine to coarse subangular to rounded flint. (TOPSOIL).					0.10 - 0.30	ES1		
		0.90						
Hand pit complete at 0.90 m bgl.								

Dimensions and Orientation:

Bearing:

Inclination:

Remarks:
1. Logged in general accordance to BS 5930:2015+A1:2020.2. Hand pit excavated to required depth of 0.9 m bgl.3. Backfilled with arisings.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
		GEDA	Hand Tools	MBP	GT	GT	1:30

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Analytical Report Number : 21-87307

Project / Site name:	Long Sutton	**Samples received on:**	15/07/2021
Your job number:	21-0536.01	**Samples instructed on/ Analysis started on:**	15/07/2021
Your order number:	DS62304	**Analysis completed by:**	23/07/2021
Report Issue Number:	1	**Report issued on:**	23/07/2021
Samples Analysed:	10 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-87307
Project / Site name: Long Sutton
Your Order No: DS62304

Lab Sample Number				1940120	1940121	1940122	1940123	1940124
Sample Reference				HDTP01-1	HDTP01-2	HDTP02-1	HDTP02-2	HDTP03-1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.26	0.30-0.38	0.10-0.24	0.30-0.40	0.00-0.09
Date Sampled				14/07/2021	14/07/2021	14/07/2021	14/07/2021	14/07/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	11	13	10	8.5
Total mass of sample received	kg	0.001	NONE	1.9	1.7	1.8	1.8	1.5
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.7	8.8	8.0	9.2	8.2
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	270	820	32	500	82
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.14	0.41	0.016	0.25	0.041
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	136	410	16.0	249	41.1
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.35	1.4	0.32	1.5	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.46	< 0.05	0.50	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.88	3.3	0.56	3.7	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.87	3.2	0.46	3.4	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.57	1.9	0.29	2.4	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.46	1.5	0.24	1.8	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.47	1.6	0.20	2.7	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.28	1.0	0.14	0.88	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.48	1.7	0.19	2.3	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.26	0.74	< 0.05	1.3	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.25	< 0.05	0.36	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.28	0.89	< 0.05	1.4	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	4.90	18.0	2.40	22.2	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.6	12	8.3	14	8.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	21	16	25	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	15	18	16	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	39	38	40	36	34
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	0.8
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	15	12	16	12
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	63	70	57	73	56

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-87307
Project / Site name: Long Sutton
Your Order No: DS62304

Lab Sample Number				1940120	1940121	1940122	1940123	1940124
Sample Reference				HDTP01-1	HDTP01-2	HDTP02-1	HDTP02-2	HDTP03-1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.26	0.30-0.38	0.10-0.24	0.30-0.40	0.00-0.09
Date Sampled				14/07/2021	14/07/2021	14/07/2021	14/07/2021	14/07/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
o-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	7.5	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	12	< 8.0	14	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	100	< 8.0	61	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	< 10	57	< 10	43	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	110	< 10	82	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	1.6	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	6.2	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	12	20	< 10	21	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	35	120	< 10	83	< 10
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	22	110	< 10	66	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	54	140	< 10	100	< 10
TPH (C35 - C40)	mg/kg	10	MCERTS	22	170	< 10	110	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-87307
Project / Site name: Long Sutton
Your Order No: DS62304

Lab Sample Number				1940125	1940126	1940127	1940128	1940129
Sample Reference				HDTP03-2	HDTP04-1	HDTP04-2	HDTP05-1	HDTP05-2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.27	0.10-0.26	0.30-0.50	0.10-0.25	0.30-0.45
Date Sampled				14/07/2021	14/07/2021	14/07/2021	14/07/2021	14/07/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	8.8	8.5	5.9	8.6	6.3
Total mass of sample received	kg	0.001	NONE	1.4	1.4	1.5	1.5	1.5
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	0.918	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	0.918	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.0	7.7	9.7	7.8	8.3
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	870	54	720	48	330
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.43	0.027	0.36	0.024	0.16
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	434	27.0	358	23.8	163
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.34	< 0.05	0.43
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.20	< 0.05	0.72
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.30	< 0.05	0.66
Phenanthrene	mg/kg	0.05	MCERTS	1.3	0.65	2.3	< 0.05	5.5
Anthracene	mg/kg	0.05	MCERTS	0.44	< 0.05	0.83	< 0.05	1.7
Fluoranthene	mg/kg	0.05	MCERTS	3.6	1.2	5.9	< 0.05	12
Pyrene	mg/kg	0.05	MCERTS	3.6	1.2	5.5	< 0.05	10
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.4	0.80	3.9	< 0.05	7.2
Chrysene	mg/kg	0.05	MCERTS	1.8	0.54	2.7	< 0.05	5.3
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.6	0.78	3.8	< 0.05	6.0
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.62	0.40	1.6	< 0.05	4.3
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.2	0.78	3.4	< 0.05	6.6
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.1	0.41	1.6	< 0.05	3.0
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.31	< 0.05	0.44	< 0.05	0.92
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.2	0.44	1.8	< 0.05	3.4
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	21.1	7.18	34.6	< 0.80	67.8
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	11	17	9.3	14
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	19	24	17	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14	23	13	18	22
Lead (aqua regia extractable)	mg/kg	1	MCERTS	36	52	26	40	38
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	0.8	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	15	16	13	17
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	66	81	63	59	88

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Analytical Report Number: 21-87307
Project / Site name: Long Sutton
Your Order No: DS62304

Lab Sample Number				1940125	1940126	1940127	1940128	1940129
Sample Reference				HDTP03-2	HDTP04-1	HDTP04-2	HDTP05-1	HDTP05-2
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10-0.27	0.10-0.26	0.30-0.50	0.10-0.25	0.30-0.45
Date Sampled				14/07/2021	14/07/2021	14/07/2021	14/07/2021	14/07/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics & Oxygenates								
Benzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
p & m-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
o-xylene	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	8.1	< 8.0	11	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	84	< 8.0	140	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC35 - EC40	mg/kg	10	NONE	48	< 10	79	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	92	< 10	150	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	5.9
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	17	10	32	< 10	38
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	110	24	210	< 10	97
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	73	< 10	130	< 10	37
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	120	34	240	< 10	140
TPH (C35 - C40)	mg/kg	10	MCERTS	120	< 10	210	< 10	37

U/S = Unsuitable Sample I/S = Insufficient Sample

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-87307
Project / Site name: Long Sutton
Your Order No: DS62304

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1940125	HDTP03-2	0.10-0.27	144	Hard/Cement Type Material	**Chrysotile**	0.918	**0.918**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Analytical Report Number : 21-87307
Project / Site name: Long Sutton

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1940120	HDTP01-1	None Supplied	0.10-0.26	Brown clay and loam with vegetation and gravel
1940121	HDTP01-2	None Supplied	0.30-0.38	Brown clay and loam with vegetation and gravel
1940122	HDTP02-1	None Supplied	0.10-0.24	Brown clay and loam with vegetation and gravel
1940123	HDTP02-2	None Supplied	0.30-0.40	Brown clay and loam with rubble and brick.
1940124	HDTP03-1	None Supplied	0.00-0.09	Brown loam and clay with vegetation and gravel
1940125	HDTP03-2	None Supplied	0.10-0.27	Brown loam and clay with vegetation and gravel
1940126	HDTP04-1	None Supplied	0.10-0.26	Brown loam and clay with vegetation and gravel
1940127	HDTP04-2	None Supplied	0.30-0.50	Brown loam and gravel with vegetation and brick.
1940128	HDTP05-1	None Supplied	0.10-0.25	Brown loam and clay with vegetation and gravel
1940129	HDTP05-2	None Supplied	0.30-0.45	Brown loam with vegetation and gravel

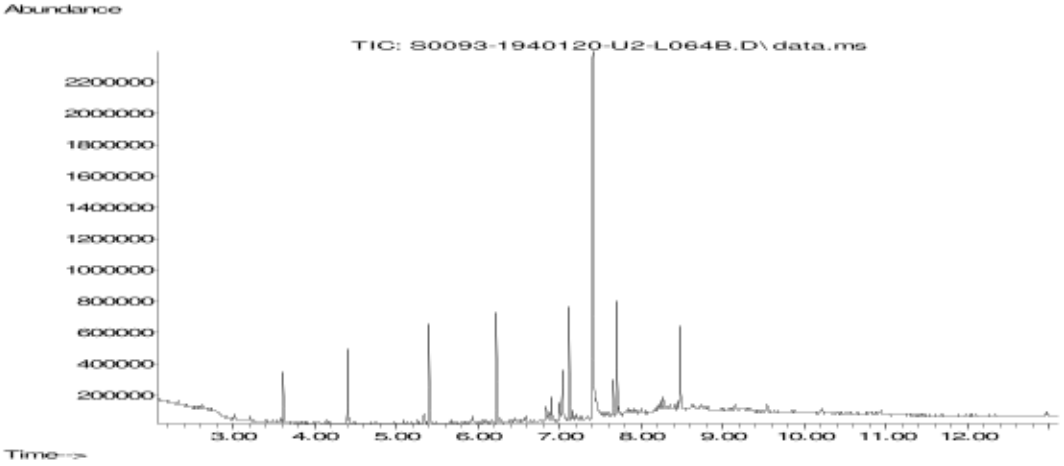
Analytical Report Number : 21-87307
Project / Site name: Long Sutton

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

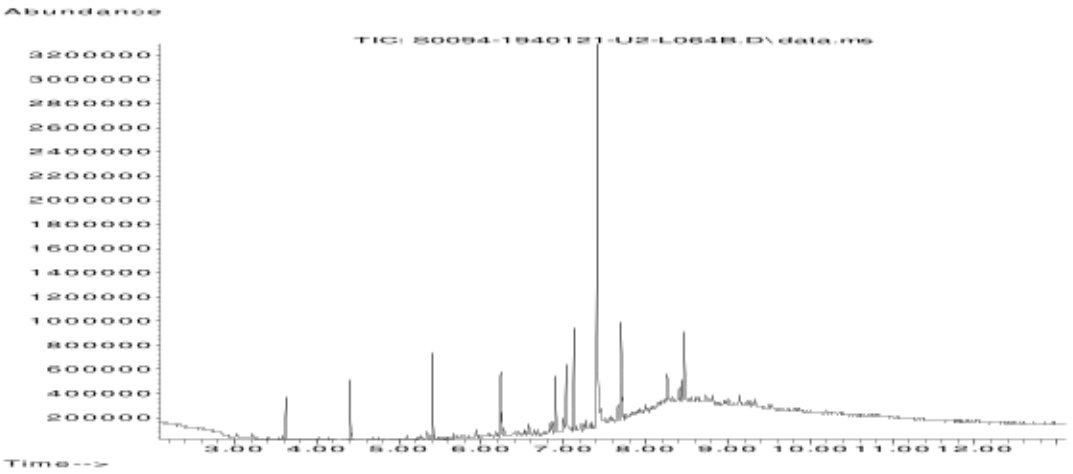
Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
TPH Chromatogram in Soil	TPH Chromatogram in Soil.	In-house method	L064-PL	D	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

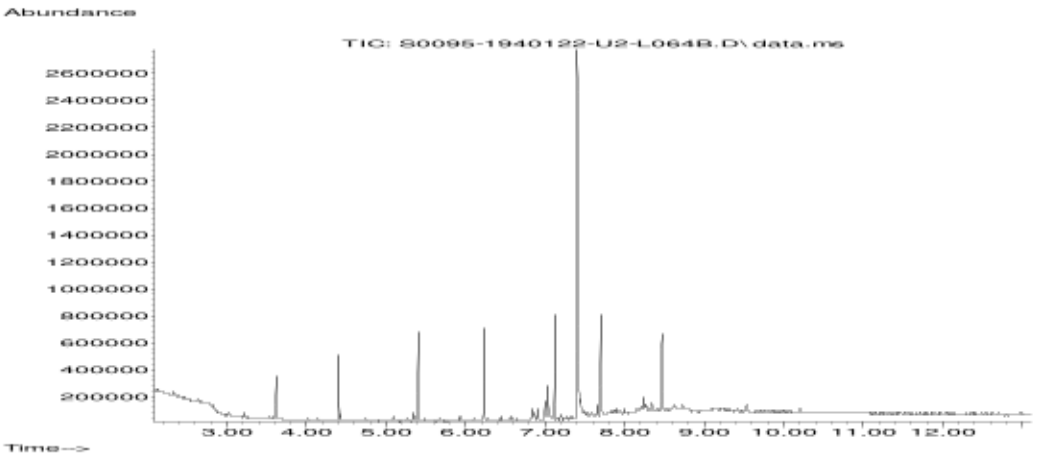
For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

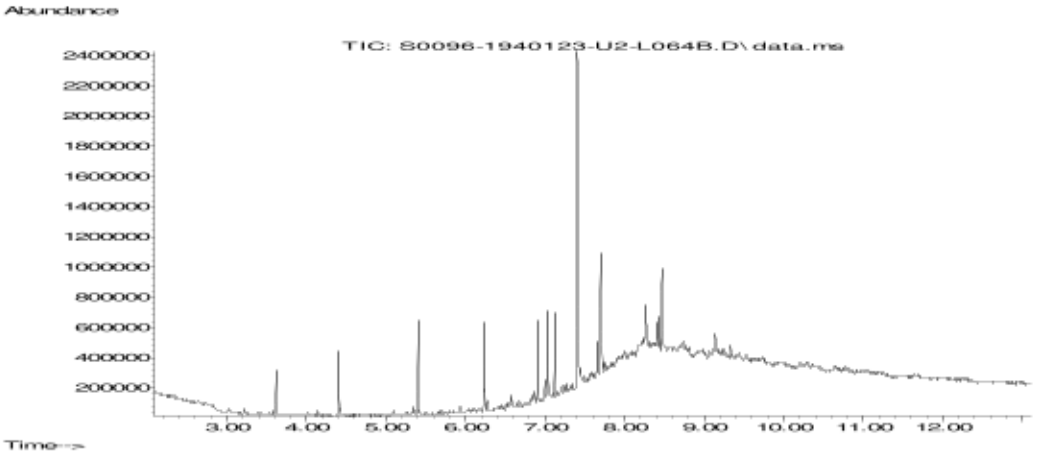
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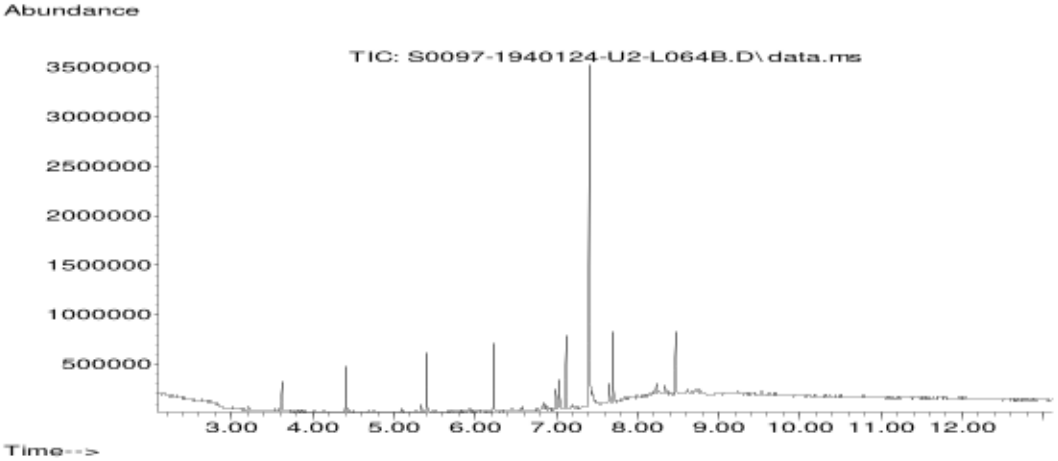


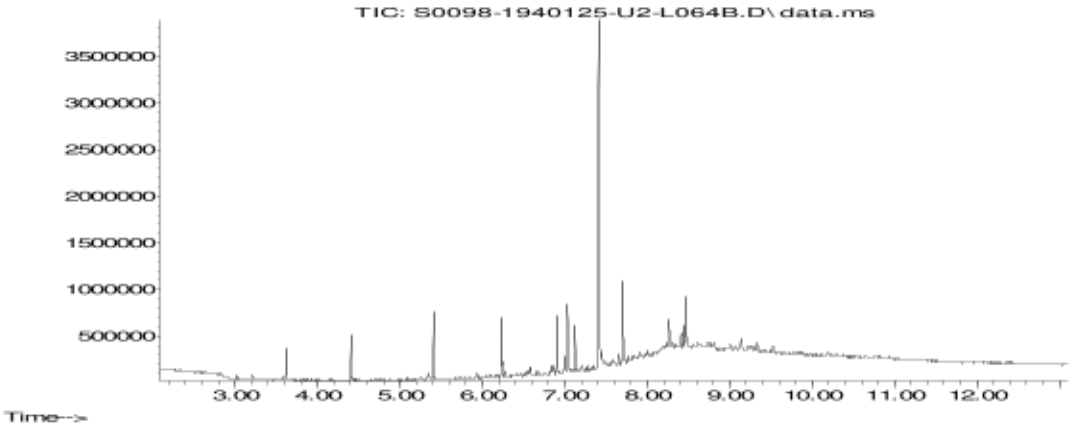
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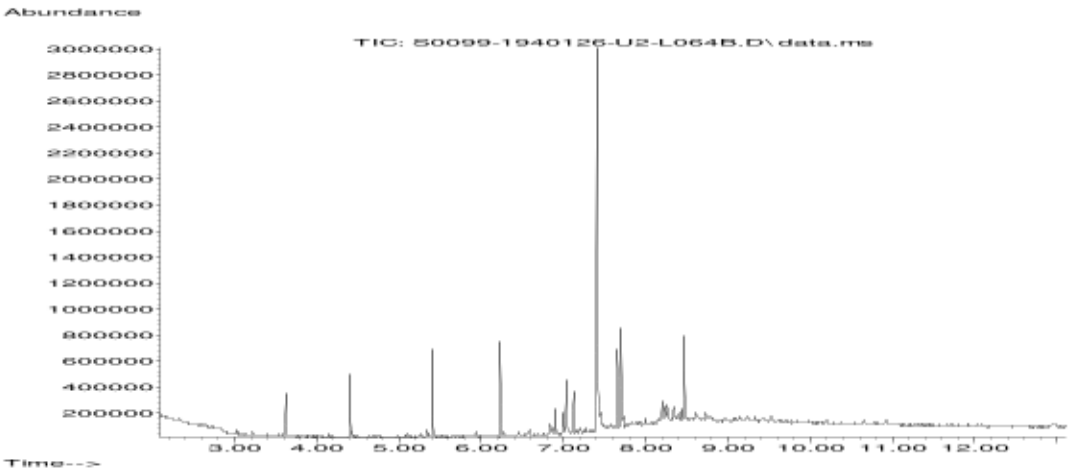

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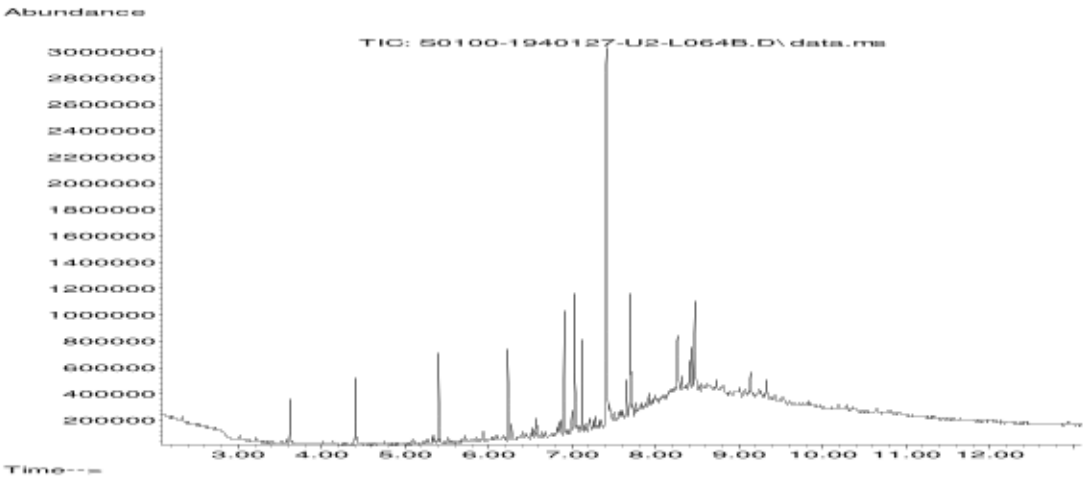

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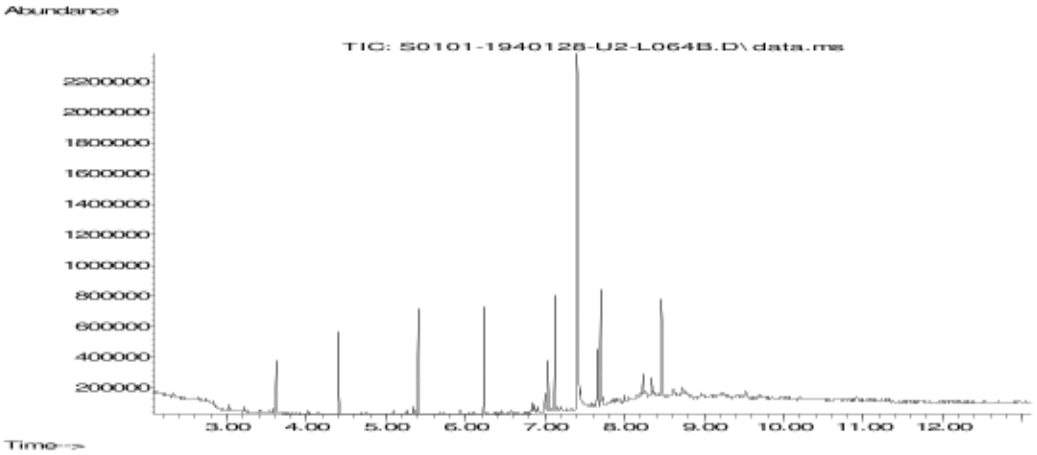

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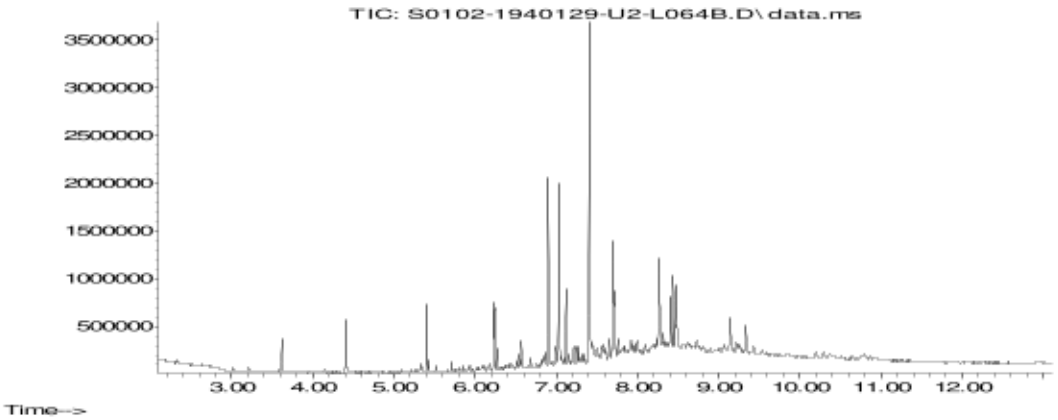

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The results included within the report are representative of the samples submitted for analysis.


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Appendix B

Target Concentrations

Threshold Concentrations for Imported Soil on Residential Development

Determinand	SGVs (mg/kg)			Source
	6% SOM			
Boron	291			LQM/CIEH
Arsenic	32			SGV
Cadmium	10			SGV
Chromium (III)	3000			LQM/CIEH
Chromium (VI)	4			LQM/CIEH
Copper	2330			LQM/CIEH
Lead	200			C4SL
Mercury	170			SGV
Nickel	130			SGV
Selenium	350			SGV
Zinc	3750			LQM/CIEH
Phenol	420			SGV
Thiocyanate	20			In house
Cyanide (Total)	34			Atkins SSV
Cyanide (Free)	34			Atkins SSV
Asbestos	Nil			In house
Poly Aromatic Hydrocarbons	**1% SOM**	**2.5%SOM**	**6%SOM**	
Acenaphthene	210	480	1000	LQM/CIEH
Acenaphthylene	170	400	850	LQM/CIEH
Naphthalene	1.5	3.7	8.7	LQM/CIEH
Fluorene	160	380	780	LQM/CIEH
Phenanthrene	92	200	380	LQM/CIEH
Anthracene	2300	4900	9200	LQM/CIEH
Fluoranthene	260	460	670	LQM/CIEH
Pyrene	560	1000	1600	LQM/CIEH
Benz(a)anthracene	3.1	4.7	5.9	LQM/CIEH
Chrysene	6	8	9.3	LQM/CIEH
Benzo(b)fluoranthene	5.6	6.5	7	LQM/CIEH
Benzo(k)fluoranthene	8.5	9.6	10	LQM/CIEH
Benzo(a)pyrene	3.6	3.6	3.6	C4SL
Indeno(123cd)pyrene	3.2	3.9	4.2	LQM/CIEH
Dibenzo(ah)anthracene	0.76	0.86	0.9	LQM/CIEH
Benzo(ghi)perylene	44	46	47	LQM/CIEH

SOM= Soil Organic Matter
All values in mg/kg unless otherwise indicated
SGV – Published Soil Guideline Value
C4SL – DEFRA Category 4 Screening Level
LQM/CIEH – Land Quality Management & Chartered Institute of Environmental Health Generic Assessment Criteria (2nd Edition).
In house – In house derived assessment value.