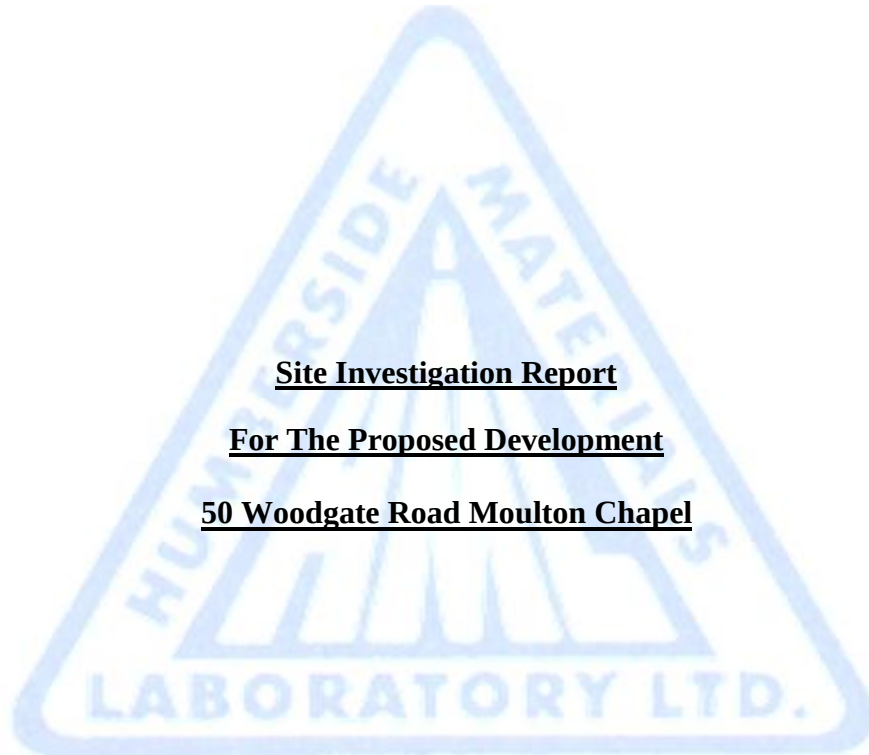


HUMBERSIDE MATERIALS LABORATORY LIMITED

Atherton Way
Brigg
North Lincolnshire
DN20 8AR
Telephone & Fax 01652 652753



Site Investigation Report **For The Proposed Development** **50 Woodgate Road Moulton Chapel**

Client Morris Builders

Date: August 2016
Report Ref: 946/3909/P

SITE INVESTIGATION REPORT FOR THE

PROPOSED DEVELOPMENT

50 WOODGATE ROAD MOULTON CHAPEL

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1.0 Introduction

At the request of Morris Builders, Humberside Materials Laboratory Limited were engaged to undertake an intrusive investigation for the proposed development adjacent to 50 Woodgate Road in Moulton Chapel.

The aim of the investigation is to assess the potential for contamination within the site. The methodology and references used in the compilation of this report includes: -

- BS 5930 - Code of practice for site investigations
- BS 1377- Soils for civil engineering purposes.
- BS 10175 - Investigation of potentially contaminated sites - Code of practice.
- CLEA documents published by DEFRA and the Environment Agency.
- LQM/CIEH S4ULs.

This report is produced solely for Morris Builders and his consultants and should only be copied in full. When transmitted electronically the definitive copy of the report is held by Humberside Materials Laboratory Ltd.

2.0 Site Description

The site is situated on land adjacent to 50 Woodgate Road in Moulton Chapel. The site is accessed from Woodgate Road and comprises of 0.1Ha. A site plan is included in appendix A. The proposals are to develop the site for one detached dwelling on the footprint of the current buildings.

The site is predominantly hardstanding of various aggregates and rubble. There is a timber building and a metal sheeted building within the site. Adjacent to the timber building are two block pillars that appear to have been the base for an above ground tank. There was no staining or discoloration was noted within the site. At the rear of the metal sheeted building there is a concrete floor slab presumably from a building that has been demolished. The site contains old wheels and parts associated with agriculture.

3.0 Site Investigation

The site was investigated on the proposals formed in the phase 1 desktop study. Three boreholes were constructed via a Dando Terrier window sampler on the 15th July 2016. This involves percussive driving of a 1m long steel tube with a plastic sample tube inserted. The tube is then hydraulic extracted, the sample tube removed and sealed. The hole is progressed to the required depths by repeating the process with extension rods. All samples were returned to the laboratory for logging and scheduling for testing.

The location for each borehole is indicated on the site plan in appendix A. Boreholes 1 was adjacent to where an above ground fuel once stood. Borehole 2 was in an area of hardstanding and borehole 3 was in the area proposed to be a rear garden.

The stratum within each borehole was logged and is presented in appendix B. Bulk samples were taken from the depths indicated on the borehole logs. Samples for contamination were taken in amber coloured glass jars. All precautions were taken to prevent cross contamination during the sampling.

Sample depths for contamination were shallow as this is the zone of most sensitive use. No visual or olfactory evidence was present to indicate contamination. No other factors were noted that would influence the recommendations of the phase 1 desktop survey.

4.0 Laboratory Testing

Contamination testing was undertaken by a UKAS/MCERTS laboratory. Testing included basic suites of metals, asbestos, speciated TPH and speciated PAH which were the contaminants of concern identified in the phase 1 desktop study.

The criteria for the assessment for contamination of the site are based on the LQM/CIEH S4ULs report, for domestic gardens with plant uptake included. This is used as a tier 1 assessment based on a minimum risk criteria undertaken by LQM using the current CLEA model.

Test reports for all the testing undertaken are included in appendix C.

The assessment for hydrocarbons is based on a soil organic matter content of 1% being the most onerous criteria.

5.0 Discussions

Reference to the British Geological map for the area indicates the geology to be tidal flat deposits of silt and clay over Oxford clay formation at depth. The investigation revealed under the superficial surface layer was clayey and sandy silts as anticipated.

The sample for borehole 2 was in made ground which was tested to represent the made ground present on site. Boreholes 1 and 3 were in natural ground.

Asbestos

Asbestos fibres were not detected in either of the natural ground samples or the made ground.

Metals

The assessment criteria in mg/kg for domestic gardens with plant uptake included is presented below, taken from the LQM/CIEH S4ULs report. This presents a minimum risk assessment. The exception to this is for lead which is taken from the Atkin Atrisk report.

element	Res veg
Arsenic	37
Boron	290
Cadmium	11
chromium III	910
chromium VI	6
lead (atkin atrisk)	276-342
Mercury element	1.2
mercury inorganic	40
mercury methyl	11
selenium	250
copper	2400
nickel	180
zinc	3700

The analysis in the first instance has included total chromium, which exists in nine oxidation states. In natural soils the most common being chromium III. Chromium IV is typically only present in soils in the vicinity of industrial processes and waste deposition, which is not the case on this site.

All values for the natural soils are well below the assessment criteria. No further evaluation is required.

The sample of made ground indicated lead to be above the Atkin Atrisk criteria. All other metals were below the assessment criteria. The material in-situ is not a growing medium and is therefore unsuitable for retention in garden areas.

Total petroleum hydrocarbons

TPH analysis has been undertaken with aromatic aliphatic equivalent carbon chain speciation on the sample adjacent to a historic above ground fuel tank. The assessment criteria in mg/kg for domestic gardens with plant uptake is presented below, taken from the LQM/CIEH S4ULs report. This presents a minimum risk assessment. The values in brackets is where either the solubility or vapour saturation is exceeded.

element	Domestic with plant uptake 1% _{som}
TPH aliphatic	
C5-6	42
C6-8	100
C8-10	27
C10-12	130 (48) ^{vap}
C12-16	1100 (24) ^{sol}
C16-35	65000 (805) ^{sol}

element	Domestic with plant uptake 1% _{som}
TPH aromatic	
C5-7	70
C7-8	130
C8-10	34
C10-12	74
C12-16	140
C16-21	260
C21-35	1100

The values are below the detection limits and well below the assessment criteria. No further evaluation is required. This is evidence that fuel had not leaked or been spilled when the tank was present.

Polyaromatic hydrocarbons

PAH analysis has been undertaken with speciation. The assessment criteria in mg/kg for domestic gardens with plant uptake included is taken from the LQM/CIEH S4ULs report, which uses the current CLEA model to give a minimum risk level.

element	Domestic with plant uptake
Acenaphthene	210
Acenaphthylene	170
Anthracene	2400
benzo a anthracene	7.2
benzo pyrene	2.2
benzo b fluoranthene	2.67
benzo k fluoranthene	77-
benzo perylene	320
chrysene	15
dibenzo anthracene	0.24
fluoranthene	280
fluorene	170
indeno pryene	27
Naphthalene	2.3
phenanthrene	95
pyrene	620
BaP as Surrogate marker	0.79

Due to the low levels recorded, the double ratios and PAH profiling has not been undertaken, as it is not required. The data indicates values well below the assessment criteria for the natural soils. No further evaluation is required.

Traces are present in the made ground but the levels are below the assessment criteria. However, it still remains that this material is unsuitable as a growth medium.

Summary

Within the natural ground the levels of contamination for metals, PAH, asbestos and TPH are well below the assessment values. This indicates contamination is not present and the land is unlikely to cause a significant risk to human health when developed for residential use.

The madeground present within the site is an unsuitable growth medium and contains lead above the assessment criteria for domestic gardens with plant uptake included. It is recommended that the madeground be removed from any garden areas.

Remediation is not required in general but the madeground should be removed from any garden area.

6.0 Conclusion

The anticipated geology of tidal flat deposits of clayey and sandy silt was encountered.

Contamination from metals, PAH, asbestos and TPH was proven by the samples not to be present within the natural ground. Remediation of the site is not required.

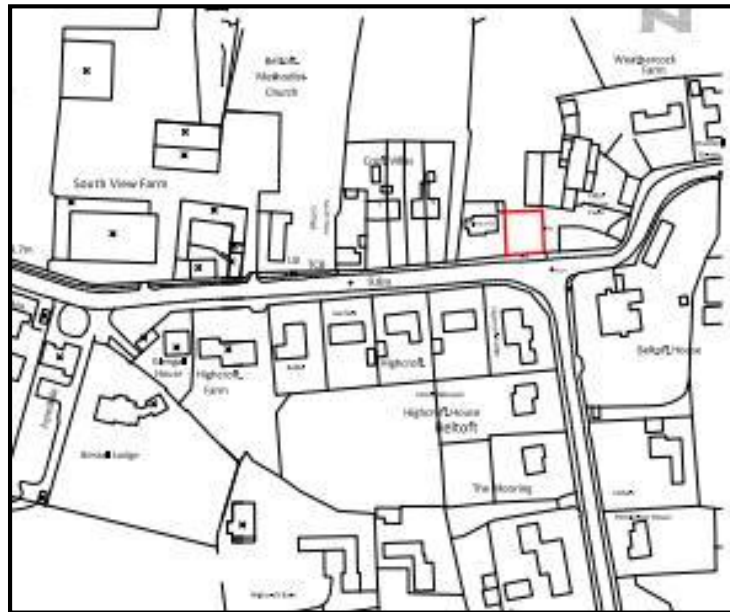
The madeground present within the site is an unsuitable growth medium and contains lead above the assessment criteria for domestic gardens with plant uptake included. It is recommended that the madeground be removed from any garden areas.

Any unforeseen contamination encountered during the development of the site should be reported to the local authority. Work should be halted in that area and the contamination investigated/assessed to the satisfaction of the local authority.

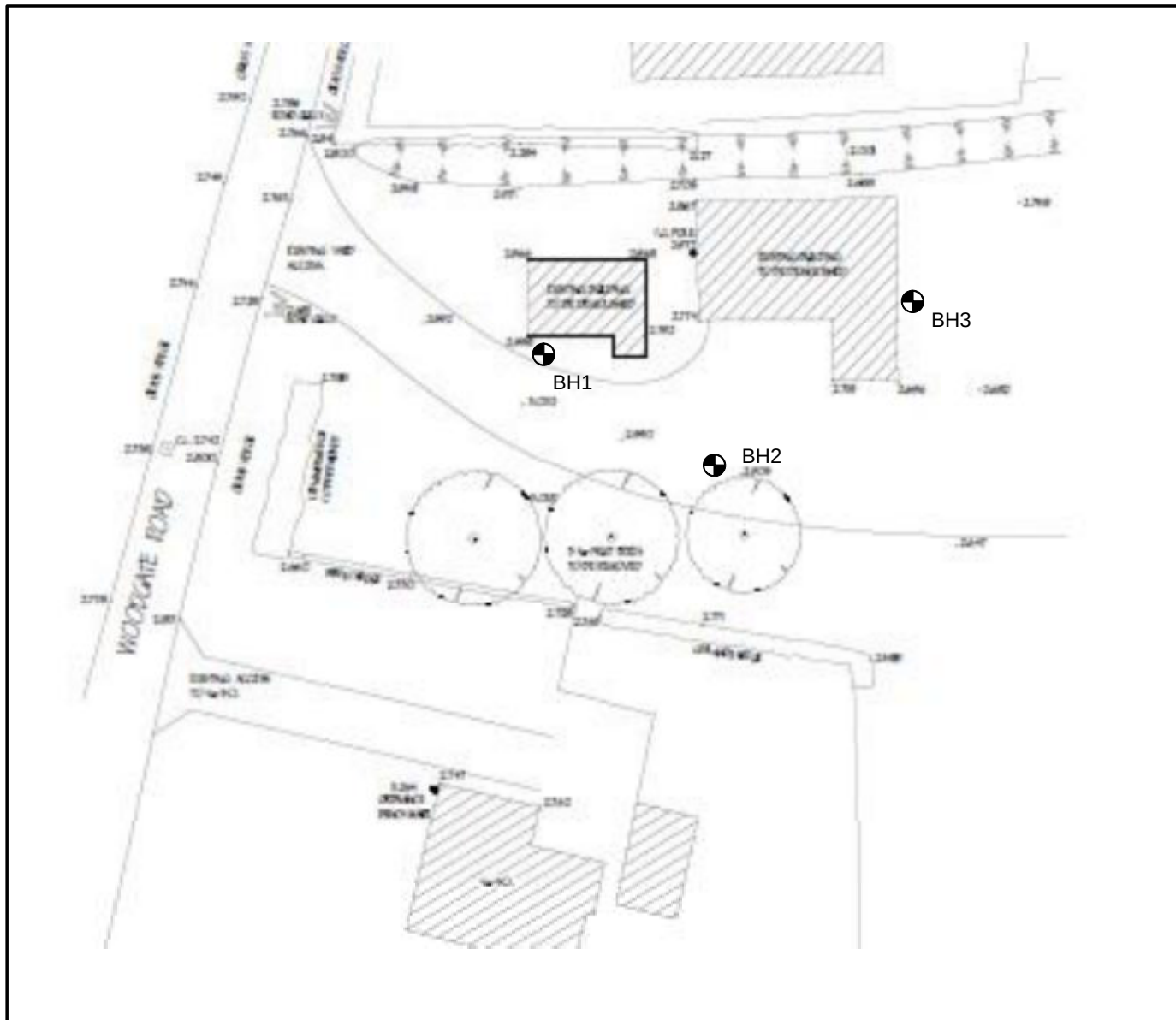
The comments given in this report and the opinions expressed assume that ground conditions do not vary beyond the range revealed by the investigation.

M.J. Green I.Eng. F.I.H.I.E.

APPENDIX A



Site location



Humberside Materials Laboratory Ltd
 Atherton Way, Brigg
 North Lincs, DN20 8AR
 Tel Fax 01652 652753

SITE PLAN

SITE :- Moulton Chapel

CLIENT :- Morris Builders

APENDIX B



HUMBERSIDE MATERIALS LABATORY Ltd.

Atherton Way, Brigg
North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
1

Client :- Morris Builders
Site :- Moulton Chapel
Project No :- 3909

Location :- see site plan
Date :- 15-Jul-16

Coordinates E: N:
Elevation :-
Excavated by :- Dando terrier
Drilled by :- HML

Depth (m)	Lithology / Description	Elevation	Thickness (m)	Samples	Water level	SPT	Notes
0	MADEGROUND	0	0.10				
0.2	Firm brown slightly clayey SILT	0.2	0.40	1 D			
0.4		0.4					
0.6	Orange brown grey SILT becoming wet and slightly sandy at 1.7m	0.6		2 U			
0.8		0.8					
1		1					
1.2		1.2	1.50				
1.4		1.4		3 U			
1.6		1.6					
1.8		1.8					
2		2					
2.2		2.2					
2.4		2.4					
2.6		2.6					
2.8		2.8					
3		3					
3.2		3.2					
3.4		3.4					
3.6		3.6					
3.8		3.8					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone
U Undisturbed

Notes :-

Depth drilled :- 2
Casing depth :- 0

File Ref :- 946 / 3909
Logged by :- M Green

Page :- 1 of 1



HUMBERSIDE MATERIALS LABATORY Ltd.

Atherton Way, Brigg
North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
2

Client :- Morris Builders
Site :- Moulton Chapel
Project No :- 3909

Location :- see site plan
Date :- 15-Jul-16

Coordinates E: N:
Elevation :-
Excavated by :- Dando terrier
Drilled by :- HML

Depth (m)	Lithology / Description	Elevation	Thickness (m)	Samples	Water level	SPT	Notes
0	MADEGROUND of brick and aggregates	0					
0.2		0.2	0.30	1 D			
0.4	Brown grey SILT becoming wet and slightly sandy at 1.7m	0.4					
0.6		0.6		2 U			
0.8		0.8					
1		1					
1.2		1.2	1.70	3 U			
1.4		1.4					
1.6		1.6					
1.8		1.8					
2		2					
2.2		2.2					
2.4		2.4					
2.6		2.6					
2.8		2.8					
3		3					
3.2		3.2					
3.4		3.4					
3.6		3.6					
3.8		3.8					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone
U Undisturbed

Notes :-

Depth drilled :- 2
Casing depth :- 0

File Ref :- 946 / 3909
Logged by :- M Green

Page :- 1 of 1



HUMBERSIDE MATERIALS LABATORY Ltd.

Atherton Way, Brigg
North Lincs DN20 8AR
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email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
3

Client :- Morris Builders
Site :- Moulton Chapel
Project No :- 3909

Location :- see site plan
Date :- 15-Jul-16

Coordinates E: N:
Elevation :-
Excavated by :- Dando terrier
Drilled by :- HML

Depth (m)	Lithology / Description	Elevation	Thickness (m)	Samples	Water level	SPT	Notes
0	Brown TOPSOIL	0	0.15				
0.2	Orange brown grey slightly clayey SILT becoming wet at 1.7m	0.2		1 D			
0.4		0.4					
0.6		0.6		2 U			
0.8		0.8					
1		1	1.85				
1.2		1.2		3 U			
1.4		1.4					
1.6		1.6					
1.8		1.8					
2		2					
2.2		2.2					
2.4		2.4					
2.6		2.6					
2.8		2.8					
3		3					
3.2		3.2					
3.4		3.4					
3.6		3.6					
3.8		3.8					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone
U Undisturbed

Notes :-

Depth drilled :- 2
Casing depth :- 0

File Ref :- 946 / 3909
Logged by :- M Green

Page :- 1 of 1

APENDIX C

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Hadfield House
Hadfield Street
Combrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 586431-1

Date of Report: 02-Aug-2016

Customer: Humberside Materials Laboratory Ltd
Atherton Way
Brigg
North Lincolnshire
DN20 8AR

Customer Contact: Mr Mick Green

Customer Job Reference: 971/3997

Customer Purchase Order: 2826

Customer Site Reference: Moulton Chapel

Date Job Received at SAL: 20-Jul-2016

Date Analysis Started: 20-Jul-2016

Date Analysis Completed: 01-Aug-2016

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

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

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with SAL SOPs

All results have been reviewed in accordance with Section 25 of the SAL Quality Manual



Report checked
and authorised by :
Mr Richard Wong
Project Manager

Issued by :
Mr Richard Wong
Project Manager



SAL Reference: 586431							
Project Site: Moulton Chapel							
Customer Reference: 971/3997							
Soil				Analysed as Soil			
ICRCL (Table 3:metals)							
SAL Reference				586431 001	586431 002	586431 003	
Customer Sample Reference				S/41977 BH1-1	S/41978 BH2-1	S/41979 BH3-1	
Top Depth				0.10	0.10	0.20	
Depth				0.50	0.30	0.50	
Date Sampled				15-JUL-2016	15-JUL-2016	15-JUL-2016	
Determinand	Method	Test Sample	LOD	Units			
Arsenic	T6	A40	1	mg/kg	9	15	9
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1
Cadmium	T6	A40	1	mg/kg	<1	<1	<1
Chromium	T6	A40	1	mg/kg	19	26	21
Copper	T6	A40	1	mg/kg	10	82	9
Lead	T6	A40	1	mg/kg	11	470	16
Mercury	T6	A40	1	mg/kg	<1	<1	<1
Nickel	T6	A40	1	mg/kg	16	26	19
Selenium	T6	A40	3	mg/kg	<3	<3	<3
Zinc	T6	A40	1	mg/kg	46	170	55

SAL Reference: 586431							
Project Site: Moulton Chapel							
Customer Reference: 971/3997							
Soil				Analysed as Soil			
Miscellaneous							
SAL Reference				586431 001	586431 002	586431 003	
Customer Sample Reference				S/41977 BH1-1	S/41978 BH2-1	S/41979 BH3-1	
Top Depth				0.10	0.10	0.20	
Depth				0.50	0.30	0.50	
Date Sampled				15-JUL-2016	15-JUL-2016	15-JUL-2016	
Determinand	Method	Test Sample	LOD	Units			
Asbestos ID	T27	AR			N.D.	N.D.	N.D.

SAL Reference: 586431 Project Site: Moulton Chapel Customer Reference: 971/3997 Soil Analysed as Soil TPH (CWG) with MTBE, BTEX					
SAL Reference				586431 001	
Customer Sample Reference				S/41977 BH1-1	
Top Depth				0.10	
Depth				0.50	
Date Sampled				15-JUL-2016	
Determinand	Method	Test Sample	LOD	Units	
Benzene	T54	AR	1	µg/kg	(13) <1
Toluene	T54	AR	1	µg/kg	(13) <1
EthylBenzene	T54	AR	1	µg/kg	<1
M/P Xylene	T54	AR	1	µg/kg	<1
O Xylene	T54	AR	1	µg/kg	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<1
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C10-C12 aliphatic)	T909	AR	1	mg/kg	(13) <1
TPH (C12-C16 aliphatic)	T909	AR	1	mg/kg	(13) <1
TPH (C16-C21 aliphatic)	T909	AR	1	mg/kg	(13) <1
TPH (C21-C35 aliphatic)	T909	AR	2	mg/kg	(13) <2
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C10-C12 aromatic)	T909	AR	2	mg/kg	(13) <2
TPH (C12-C16 aromatic)	T909	AR	1	mg/kg	(13) <1
TPH (C16-C21 aromatic)	T909	AR	1	mg/kg	(13) <1
TPH (C21-C35 aromatic)	T909	AR	1	mg/kg	(13) <1

SAL Reference: 586431							
Project Site: Moulton Chapel							
Customer Reference: 971/3997							
Soil		Analysed as Soil					
PAH US EPA 16 (B and K split)							
SAL Reference					586431 001	586431 002	586431 003
Customer Sample Reference					S/41977 BH1-1	S/41978 BH2-1	S/41979 BH3-1
Top Depth					0.10	0.10	0.20
Depth					0.50	0.30	0.50
Date Sampled					15-JUL-2016	15-JUL-2016	15-JUL-2016
Determinand	Method	Test Sample	LOD	Units			
Naphthalene	T149	AR	0.01	mg/kg	<0.01	0.14	<0.01
Acenaphthylene	T149	AR	0.01	mg/kg	<0.01	0.02	<0.01
Acenaphthene	T149	AR	0.01	mg/kg	<0.01	0.01	<0.01
Fluorene	T149	AR	0.01	mg/kg	<0.01	0.01	<0.01
Phenanthrene	T149	AR	0.01	mg/kg	<0.01	0.17	0.01
Anthracene	T149	AR	0.01	mg/kg	<0.01	0.06	<0.01
Fluoranthene	T149	AR	0.01	mg/kg	<0.01	0.35	<0.01
Pyrene	T149	AR	0.01	mg/kg	<0.01	0.30	<0.01
Benzo(a)Anthracene	T149	AR	0.01	mg/kg	0.01	0.19	0.01
Chrysene	T149	AR	0.01	mg/kg	<0.01	0.20	<0.01
Benzo(b)fluoranthene	T149	AR	0.01	mg/kg	<0.01	0.35	<0.01
Benzo(k)fluoranthene	T149	AR	0.01	mg/kg	<0.01	0.10	<0.01
Benzo(a)Pyrene	T149	AR	0.01	mg/kg	<0.01	0.21	0.01
Indeno(123-cd)Pyrene	T149	AR	0.01	mg/kg	<0.01	0.18	<0.01
Dibenzo(ah)Anthracene	T149	AR	0.01	mg/kg	<0.01	0.04	<0.01
Benzo(ghi)Perylene	T149	AR	0.01	mg/kg	<0.01	0.26	<0.01
PAH(total)	T149	AR	0.01	ma/kg	0.01	2.6	0.03

Index to symbols used in 586431-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
N.D.	Not Detected
13	Results have been blank corrected.
S	Analysis was subcontracted
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos ID performed at REC Asbestos
Samples submitted for GC/MS (Headspace) analysis were submitted in inappropriate containers. It is possible therefore that the results provided may be compromised.

Method Index

Value	Description
T149	GC/MS (SIR)
T909	GCxGC
T6	ICP/OES
T27	PLM
T54	GC/MS (Headspace)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Asbestos ID	T27	AR			SU	001-003
Arsenic	T6	A40	1	mg/kg	U	001-003
Boron (water-soluble)	T6	AR	1	mg/kg	N	001-003
Cadmium	T6	A40	1	mg/kg	U	001-003
Chromium	T6	A40	1	mg/kg	U	001-003
Copper	T6	A40	1	mg/kg	U	001-003
Lead	T6	A40	1	mg/kg	U	001-003
Mercury	T6	A40	1	mg/kg	U	001-003
Nickel	T6	A40	1	mg/kg	U	001-003
Selenium	T6	A40	3	mg/kg	U	001-003
Zinc	T6	A40	1	mg/kg	U	001-003
Naphthalene	T149	AR	0.01	mg/kg	U	001-003
Acenaphthylene	T149	AR	0.01	mg/kg	U	001-003
Acenaphthene	T149	AR	0.01	mg/kg	U	001-003
Fluorene	T149	AR	0.01	mg/kg	U	001-003
Phenanthrene	T149	AR	0.01	mg/kg	U	001-003
Anthracene	T149	AR	0.01	mg/kg	U	001-003
Fluoranthene	T149	AR	0.01	mg/kg	U	001-003
Pyrene	T149	AR	0.01	mg/kg	U	001-003
Benzo(a)Anthracene	T149	AR	0.01	mg/kg	U	001-003
Chrysene	T149	AR	0.01	mg/kg	U	001-003
Benzo(b)fluoranthene	T149	AR	0.01	mg/kg	U	001-003
Benzo(k)fluoranthene	T149	AR	0.01	mg/kg	U	001-003
Benzo(a)Pyrene	T149	AR	0.01	mg/kg	U	001-003
Indeno(123-cd)Pyrene	T149	AR	0.01	mg/kg	U	001-003
Dibenzo(ah)Anthracene	T149	AR	0.01	mg/kg	U	001-003
Benzo(ghi)Perylene	T149	AR	0.01	mg/kg	U	001-003
PAH(total)	T149	AR	0.01	mg/kg	U	001-003
Benzene	T54	AR	1	µg/kg	U	001
Toluene	T54	AR	1	µg/kg	U	001
EthylBenzene	T54	AR	1	µg/kg	U	001
M/P Xylene	T54	AR	1	µg/kg	U	001
O Xylene	T54	AR	1	µg/kg	U	001
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	001
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	001
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	001
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	001
TPH (C10-C12 aliphatic)	T909	AR	1	mg/kg	U	001
TPH (C12-C16 aliphatic)	T909	AR	1	mg/kg	U	001

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
TPH (C16-C21 aliphatic)	T909	AR	1	mg/kg	U	001
TPH (C21-C35 aliphatic)	T909	AR	2	mg/kg	U	001
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	001
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	001
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	001
TPH (C10-C12 aromatic)	T909	AR	2	mg/kg	U	001
TPH (C12-C16 aromatic)	T909	AR	1	mg/kg	U	001
TPH (C16-C21 aromatic)	T909	AR	1	mg/kg	U	001
TPH (C21-C35 aromatic)	T909	AR	1	mg/kg	U	001

