

Appendix A5 – Chemical Laboratory Test Results

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 595214-1

Date of Report: 05-Sep-2016

Customer: Curtins Consulting Ltd.
Curtins Consulting
Quayside
40-58 Hotwell Road
Bristol
BS8 4UQ

Customer Contact: Mr Graham Behrens

Customer Job Reference: B041466.002/GB/7058

Customer Purchase Order: EBMA209

Customer Site Reference: St Patrick Hall, Reading University

Date Job Received at SAL: 24-Aug-2016

Date Analysis Started: 25-Aug-2016

Date Analysis Completed: 05-Sep-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 :
Muhammad Waqas
Project Manager

Issued by :
Muhammad Waqas
Project Manager

Project Site: St Patrick Hall, Reading University
Customer Reference: B041466.002/GB/7058

Soil	Analysed as Soil
Heavy Metals(9)	

SAL Reference					595214 001	595214 002	595214 003	595214 005	595214 006
Customer Sample Reference					WS1	WS1	WS2	WS3	WS3
Depth					0.1	0.3	0.1	0.3	1.0
Date Sampled					19-AUG-2016	19-AUG-2016	19-AUG-2016	19-AUG-2016	19-AUG-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T6	M40	2	mg/kg	10	10	9	52	25
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	14	16	15	16	21
Copper	T6	M40	1	mg/kg	17	8	29	22	12
Lead	T6	M40	1	mg/kg	79	14	120	110	28
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	8	8	10	11	15
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T6	M40	1	mg/kg	59	23	110	140	75

Project Site: St Patrick Hall, Reading University
Customer Reference: B041466.002/GB/7058

Soil	Analysed as Soil
Heavy Metals(9)	

SAL Reference					595214 007	595214 009	595214 010
Customer Sample Reference					WS4	WS6	WS6
Depth					0.2	0.2	0.5
Date Sampled					19-AUG-2016	19-AUG-2016	19-AUG-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units			
Arsenic	T6	M40	2	mg/kg	22	14	16
Cadmium	T6	M40	1	mg/kg	<1	<1	<1
Chromium	T6	M40	1	mg/kg	15	16	24
Copper	T6	M40	1	mg/kg	24	16	17
Lead	T6	M40	1	mg/kg	150	150	29
Mercury	T6	M40	1	mg/kg	<1	<1	<1
Nickel	T6	M40	1	mg/kg	11	10	14
Selenium	T6	M40	3	mg/kg	<3	<3	<3
Zinc	T6	M40	1	ma/kq	100	56	41

SAL Reference: 595214 Project Site: St Patrick Hall, Reading University Customer Reference: B041466.002/GB/7058									
Soil					Analysed as Soil				
Curtins Suite A									
SAL Reference					595214 001	595214 003	595214 005	595214 007	595214 009
Customer Sample Reference					WS1	WS2	WS3	WS4	WS6
Depth					0.1	0.1	0.3	0.2	0.2
Date Sampled					19-AUG-2016	19-AUG-2016	19-AUG-2016	19-AUG-2016	19-AUG-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	N.D.	N.D.
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
pH	T7	AR			7.0	7.8	7.9	7.6	6.7
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Retained on 10mm sieve	T2	AR	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Soil Organic Matter	T287	AR	0.1	%	3.2	4.1	3.2	4.2	3.9
SO4(Total)	T6	A40	0.01	%	0.06	0.06	0.05	0.08	0.06
Sulphide	T4	AR	10	mg/kg	<10	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	0.03	0.03	0.02	0.03	0.03

SAL Reference: 595214							
Project Site: St Patrick Hall, Reading University							
Customer Reference: B041466.002/GB/7058							
Soil				Analysed as Soil			
Curtins Suite B							
SAL Reference					595214 002	595214 006	595214 010
Customer Sample Reference					WS1	WS3	WS6
Depth					0.3	1.0	0.5
Date Sampled					19-AUG-2016	19-AUG-2016	19-AUG-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units			
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1
pH	T7	AR			7.4	7.7	6.9
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1
Retained on 10mm sieve	T2	AR	0.1	%	<0.1	<0.1	<0.1
Soil Organic Matter	T287	AR	0.1	%	0.6	0.7	0.9
SO4(Total)	T6	A40	0.01	%	0.02	0.02	0.02
Sulphide	T4	AR	10	mg/kg	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	0.01	<0.01	<0.01
TPH (C8-C10)	T8	M105	1	mg/kg	(13) <1	(13) <1	(13) <1
TPH (C10-C12)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) <1
TPH (C12-C16)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) <1
TPH (C16-C21)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) <1
TPH (C21-C35)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) <1

SAL Reference: 595214 Project Site: St Patrick Hall, Reading University Customer Reference: B041466.002/GB/7058 Soil Analysed as Soil Total and Speciated USEPA16 PAH									
SAL Reference				595214 001	595214 002	595214 003	595214 005	595214 006	
Customer Sample Reference				WS1	WS1	WS2	WS3	WS3	
Depth				0.1	0.3	0.1	0.3	1.0	
Date Sampled				19-AUG-2016	19-AUG-2016	19-AUG-2016	19-AUG-2016	19-AUG-2016	
Type				Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.4	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.3	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	<0.1	2.4	0.4	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	2.0	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	0.2	<0.1	4.2	1.0	<0.1
Pyrene	T207	M105	0.1	mg/kg	0.2	<0.1	3.7	1.0	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	0.1	<0.1	3.3	0.5	<0.1
Chrysene	T207	M105	0.1	mg/kg	0.1	<0.1	3.0	0.6	<0.1
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	0.2	<0.1	5.0	1.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	0.1	<0.1	2.4	0.5	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	1.5	0.3	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.6	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	1.4	0.4	<0.1
PAH(total)	T207	M105	0.1	mg/kg	0.9	<0.1	30	5.8	<0.1

SAL Reference: 595214							
Project Site: St Patrick Hall, Reading University							
Customer Reference: B041466.002/GB/7058							
Soil				Analysed as Soil			
Total and Speciated USEPA16 PAH							
SAL Reference				595214 007	595214 009	595214 010	
Customer Sample Reference				WS4	WS6	WS6	
Depth				0.2	0.2	0.5	
Date Sampled				19-AUG-2016	19-AUG-2016	19-AUG-2016	
Type				Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units			
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	0.9	0.2	<0.1
Anthracene	T207	M105	0.1	mg/kg	0.2	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	2.4	0.7	<0.1
Pyrene	T207	M105	0.1	mg/kg	2.2	0.7	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	1.4	0.4	<0.1
Chrysene	T207	M105	0.1	mg/kg	1.8	0.4	<0.1
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	2.8	0.7	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	1.3	0.3	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	0.9	0.2	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	0.3	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	1.0	0.2	<0.1
PAH(total)	T207	M105	0.1	mg/kg	15	4.0	<0.1

Index to symbols used in 595214-1

Value	Description
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C

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

Notes

Asbestos was subcontracted to REC Asbestos

Method Index

Value	Description
T27	PLM
T4	Colorimetry
T54	GC/MS (Headspace)
T206	GC/FID (MCERTS)
T546	Colorimetry (CF)
T7	Probe
T287	Calc TOC/0.58
T2	Grav
T8	GC/FID
T207	GC/MS (MCERTS)
T6	ICP/OES
T162	Grav (1 Dec) (105 C)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Arsenic	T6	M40	2	mg/kg	M	001-003,005-007,009-010
Cadmium	T6	M40	1	mg/kg	M	001-003,005-007,009-010
Chromium	T6	M40	1	mg/kg	M	001-003,005-007,009-010
Copper	T6	M40	1	mg/kg	M	001-003,005-007,009-010
Lead	T6	M40	1	mg/kg	M	001-003,005-007,009-010
Mercury	T6	M40	1	mg/kg	M	001-003,005-007,009-010
Nickel	T6	M40	1	mg/kg	M	001-003,005-007,009-010
Selenium	T6	M40	3	mg/kg	M	001-003,005-007,009-010
Zinc	T6	M40	1	mg/kg	M	001-003,005-007,009-010
Asbestos ID	T27	AR			SU	001,003,005,007,009
Boron (water-soluble)	T6	AR	1	mg/kg	N	001-003,005-007,009-010
Chromium VI	T6	AR	1	mg/kg	N	001-003,005-007,009-010
Cyanide(Total)	T546	AR	1	mg/kg	M	001-003,005-007,009-010
pH	T7	AR			M	001-003,005-007,009-010
Phenols(Mono)	T546	AR	1	mg/kg	M	001-003,005-007,009-010
Retained on 10mm sieve	T2	AR	0.1	%	N	001-003,005-007,009-010
Soil Organic Matter	T287	AR	0.1	%	N	001-003,005-007,009-010
SO4(Total)	T6	A40	0.01	%	N	001-003,005-007,009-010
Sulphide	T4	AR	10	mg/kg	N	001-003,005-007,009-010
Sulphur (total)	T6	A40	0.01	%	N	001-003,005-007,009-010
TPH (C8-C10)	T8	M105	1	mg/kg	U	002,006,010
TPH (C10-C12)	T206	M105	1	mg/kg	M	002,006,010
TPH (C12-C16)	T206	M105	1	mg/kg	M	002,006,010
TPH (C16-C21)	T206	M105	1	mg/kg	M	002,006,010
TPH (C21-C35)	T206	M105	1	mg/kg	M	002,006,010
Benzene	T54	AR	1	µg/kg	U	001,003,005,007,009
Toluene	T54	AR	1	µg/kg	U	001,003,005,007,009
EthylBenzene	T54	AR	1	µg/kg	U	001,003,005,007,009
M/P Xylene	T54	AR	1	µg/kg	U	001,003,005,007,009
O Xylene	T54	AR	1	µg/kg	U	001,003,005,007,009
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	001,003,005,007,009
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009
TPH (C10-C12 aliphatic)	T8	M105	1	mg/kg	N	001,003,005,007,009
TPH (C12-C16 aliphatic)	T8	M105	1	mg/kg	N	001,003,005,007,009

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
TPH (C16-C21 aliphatic)	T8	M105	1	mg/kg	N	001,003,005,007,009
TPH (C21-C35 aliphatic)	T8	M105	1	mg/kg	N	001,003,005,007,009
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009
TPH (C10-C12 aromatic)	T8	M105	1	mg/kg	N	001,003,005,007,009
TPH (C12-C16 aromatic)	T8	M105	1	mg/kg	N	001,003,005,007,009
TPH (C16-C21 aromatic)	T8	M105	1	mg/kg	N	001,003,005,007,009
TPH (C21-C35 aromatic)	T8	M105	1	mg/kg	N	001,003,005,007,009
Moisture @105C	T162	AR	0.1	%	N	001-003,005-007,009-010
Naphthalene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-003,005-007,009-010
Acenaphthene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Fluorene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Phenanthrene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Anthracene	T207	M105	0.1	mg/kg	U	001-003,005-007,009-010
Fluoranthene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Pyrene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Chrysene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-003,005-007,009-010
PAH(total)	T207	M105	0.1	mg/kg	U	001-003,005-007,009-010



Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 594674-1

Date of Report: 02-Sep-2016

Customer: Curtins Consulting Ltd.
Curtins Consulting
Quayside
40-58 Hotwell Road
Bristol
BS8 4UQ

Customer Contact: Mr Graham Behrens

Customer Job Reference: B041466.002/GB/7047

Customer Purchase Order: EBMA209

Customer Site Reference: St Patrick Hall, Reading University

Date Job Received at SAL: 19-Aug-2016

Date Analysis Started: 23-Aug-2016

Date Analysis Completed: 02-Sep-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 :
Bianca Prince
Customer Service Manager

Issued by :
Bianca Prince
Customer Service Manager

SAL Reference					594674 001	594674 002	594674 003	594674 005	594674 007
Customer Sample Reference					BH2	BH2	BH3	TP1	TP2
Depth					0.3	1.2	0.4	0.4	0.2
Date Sampled					15-AUG-2016	15-AUG-2016	16-AUG-2016	16-AUG-2016	16-AUG-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T6	M40	2	mg/kg	12	23	9	9	6
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	15	33	21	18	14
Copper	T6	M40	1	mg/kg	19	21	15	10	9
Lead	T6	M40	1	mg/kg	140	26	62	45	34
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	10	29	9	10	7
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T6	M40	1	mg/kg	90	63	52	35	33

SAL Reference					594674 008	594674 009	594674 010	594674 011	594674 013
Customer Sample Reference					TP2	BH1	BH1	BH4	BH5
Depth					0.7	0.2	0.7	0.1	0.3
Date Sampled					16-AUG-2016	17-AUG-2016	17-AUG-2016	17-AUG-2016	17-AUG-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T6	M40	2	mg/kg	31	6	11	9	6
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	28	11	21	38	12
Copper	T6	M40	1	mg/kg	31	7	9	11	8
Lead	T6	M40	1	mg/kg	32	32	21	33	15
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	28	6	9	12	7
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T6	M40	1	mg/ka	60	29	29	43	22

SAL Reference					594674 014	594674 015	594674 017	594674 018	594674 019
Customer Sample Reference					BH5	BH6	BH7	BH7	WS5
Depth					0.6	0.1	0.3	0.8	0.2
Date Sampled					17-AUG-2016	18-AUG-2016	18-AUG-2016	18-AUG-2016	18-AUG-2016
Type					Clay	Clay	Sandy Soil	Clay	Topsoil
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T6	M40	2	mg/kg	9	20	9	11	7
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	19	39	17	30	13
Copper	T6	M40	1	mg/kg	11	21	17	14	10
Lead	T6	M40	1	mg/kg	16	20	73	15	38
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	9	20	9	14	7
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T6	M40	1	mg/kg	26	50	61	41	35

Project Site: St Patrick Hall, Reading University
Customer Reference: B041466.002/GB/7047

Soil	Analysed as Soil
Heavy Metals(9)	

SAL Reference					594674 021	594674 023	594674 024	594674 025	594674 026
Customer Sample Reference					WS7	WS8	WS8	WS9	WS9
Depth					0.1	0.3	1.0	0.15	0.6
Date Sampled					18-AUG-2016	18-AUG-2016	18-AUG-2016	18-AUG-2016	18-AUG-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Topsoil	Clay
Determinand	Method	Test Sample	LOD	Units					
Arsenic	T6	M40	2	mg/kg	6	9	15	9	11
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	11	16	28	17	26
Copper	T6	M40	1	mg/kg	12	18	8	13	12
Lead	T6	M40	1	mg/kg	33	82	14	78	20
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	7	12	18	10	12
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T6	M40	1	mg/kg	57	120	35	57	34

Project Site: St Patrick Hall, Reading University
Customer Reference: B041466.002/GB/7047

Soil	Analysed as Soil
Heavy Metals(9)	

SAL Reference					594674 027
Customer Sample Reference					WS10
Depth					0.1
Date Sampled					18-AUG-2016
Type					Topsoil
Determinand	Method	Test Sample	LOD	Units	
Arsenic	T6	M40	2	mg/kg	13
Cadmium	T6	M40	1	mg/kg	<1
Chromium	T6	M40	1	mg/kg	18
Copper	T6	M40	1	mg/kg	24
Lead	T6	M40	1	mg/kg	94
Mercury	T6	M40	1	mg/kg	<1
Nickel	T6	M40	1	mg/kg	14
Selenium	T6	M40	3	mg/kg	<3
Zinc	T6	M40	1	ma/ka	87

SAL Reference: 594674									
Project Site: St Patrick Hall, Reading University									
Customer Reference: B041466.002/GB/7047									
Soil					Analysed as Soil				
Curtins Suite A									
SAL Reference					594674 001	594674 003	594674 005	594674 007	594674 009
Customer Sample Reference					BH2	BH3	TP1	TP2	BH1
Depth					0.3	0.4	0.4	0.2	0.2
Date Sampled					15-AUG-2016	16-AUG-2016	16-AUG-2016	16-AUG-2016	17-AUG-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil
Determinand	Method	Test Sample	LOD	Units					
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	N.D.	N.D.
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	7	7	7	6	8
pH	T7	AR			6.7	7.3	7.1	6.4	7.7
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Retained on 10mm sieve	T2	AR	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Soil Organic Matter	T287	AR	0.1	%	3.5	3.1	2.1	1.5	1.9
SO4(Total)	T6	A40	0.01	%	0.06	0.07	0.05	0.04	0.04
Sulphide	T4	AR	10	mg/kg	<10	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	0.03	0.03	0.02	0.01	0.01

SAL Reference: 594674									
Project Site: St Patrick Hall, Reading University									
Customer Reference: B041466.002/GB/7047									
Soil					Analysed as Soil				
Curtins Suite A									
SAL Reference					594674 011	594674 013	594674 015	594674 017	594674 019
Customer Sample Reference					BH4	BH5	BH6	BH7	WS5
Depth					0.1	0.3	0.1	0.3	0.2
Date Sampled					17-AUG-2016	17-AUG-2016	18-AUG-2016	18-AUG-2016	18-AUG-2016
Type					Sandy Soil	Sandy Soil	Clay	Sandy Soil	Topsoil
Determinand	Method	Test Sample	LOD	Units					
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	N.D.	N.D.
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	8	7	7	7	8
pH	T7	AR			7.6	6.6	7.2	6.7	7.7
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Retained on 10mm sieve	T2	AR	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Soil Organic Matter	T287	AR	0.1	%	0.5	0.8	0.6	1.8	2.6
SO4(Total)	T6	A40	0.01	%	0.02	0.03	0.03	0.04	0.05
Sulphide	T4	AR	10	mg/kg	<10	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	0.02	<0.01	0.02	0.02	0.02

SAL Reference: 594674 Project Site: St Patrick Hall, Reading University Customer Reference: B041466.002/GB/7047								
Soil Curtins Suite A								
Analysed as Soil								
SAL Reference					594674 021	594674 023	594674 025	594674 027
Customer Sample Reference					WS7	WS8	WS9	WS10
Depth					0.1	0.3	0.15	0.1
Date Sampled					18-AUG-2016	18-AUG-2016	18-AUG-2016	18-AUG-2016
Type					Sandy Soil	Sandy Soil	Topsoil	Topsoil
Determinand	Method	Test Sample	LOD	Units				
Asbestos ID	T27	AR			N.D.	N.D.	N.D.	N.D.
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	8	10	8	7
pH	T7	AR			7.5	10.1	8.0	7.1
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1
Retained on 10mm sieve	T2	AR	0.1	%	<0.1	<0.1	<0.1	<0.1
Soil Organic Matter	T287	AR	0.1	%	6.3	1.1	1.6	3.4
SO4(Total)	T6	A40	0.01	%	0.05	0.32	0.03	0.05
Sulphide	T4	AR	10	mg/kg	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	0.03	0.11	0.01	0.02

SAL Reference: 594674 Project Site: St Patrick Hall, Reading University Customer Reference: B041466.002/GB/7047									
Soil Curtins Suite B									
Analysed as Soil									
SAL Reference					594674 002	594674 008	594674 010	594674 014	594674 018
Customer Sample Reference					BH2	TP2	BH1	BH5	BH7
Depth					1.2	0.7	0.7	0.6	0.8
Date Sampled					15-AUG-2016	16-AUG-2016	17-AUG-2016	17-AUG-2016	18-AUG-2016
Type					Sandy Soil	Sandy Soil	Sandy Soil	Clay	Clay
Determinand	Method	Test Sample	LOD	Units					
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	8	7	8	6	7
pH	T7	AR			7.6	6.7	7.6	6.5	6.9
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Retained on 10mm sieve	T2	AR	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Soil Organic Matter	T287	AR	0.1	%	1.0	0.6	0.9	0.9	0.7
SO4(Total)	T6	A40	0.01	%	0.02	0.02	0.02	0.03	0.02
Sulphide	T4	AR	10	mg/kg	<10	<10	<10	<10	<10
Sulphur (total)	T6	A40	0.01	%	0.01	<0.01	0.01	<0.01	0.02
TPH (C8-C10)	T8	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
TPH (C10-C12)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
TPH (C12-C16)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
TPH (C16-C21)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) 1
TPH (C21-C35)	T206	M105	1	mg/kg	(13) <1	(13) <1	(13) 2	(13) 2	(13) 43

SAL Reference: 594674 Project Site: St Patrick Hall, Reading University Customer Reference: B041466.002/GB/7047 Soil Analysed as Soil Curtins Suite B						
SAL Reference				594674 024	594674 026	
Customer Sample Reference				WS8	WS9	
Depth				1.0	0.6	
Date Sampled				18-AUG-2016	18-AUG-2016	
Type				Sandy Soil	Clay	
Determinand	Method	Test Sample	LOD	Units		
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1
Chromium VI	T6	AR	1	mg/kg	<1	<1
Cyanide(Total)	T546	AR	1	mg/kg	8	8
pH	T7	AR			7.9	7.8
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1
Retained on 10mm sieve	T2	AR	0.1	%	<0.1	<0.1
Soil Organic Matter	T287	AR	0.1	%	<0.1	0.5
SO4(Total)	T6	A40	0.01	%	0.02	0.01
Sulphide	T4	AR	10	mg/kg	<10	<10
Sulphur (total)	T6	A40	0.01	%	<0.01	<0.01
TPH (C8-C10)	T8	M105	1	mg/kg	(13) <1	(13) <1
TPH (C10-C12)	T206	M105	1	mg/kg	(13) <1	(13) <1
TPH (C12-C16)	T206	M105	1	mg/kg	(13) <1	(13) <1
TPH (C16-C21)	T206	M105	1	mg/kg	(13) <1	(13) <1
TPH (C21-C35)	T206	M105	1	mg/kg	(13) <1	(13) <1

SAL Reference: 594674										
Project Site: St Patrick Hall, Reading University										
Customer Reference: B041466.002/GB/7047										
Soil					Analysed as Soil					
TPH (CWG)										
SAL Reference					594674 001	594674 003	594674 005	594674 007	594674 009	
Customer Sample Reference					BH2	BH3	TP1	TP2	BH1	
Depth					0.3	0.4	0.4	0.2	0.2	
Date Sampled					15-AUG-2016	16-AUG-2016	16-AUG-2016	16-AUG-2016	17-AUG-2016	
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units						
Benzene	T54	AR	1	µg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1	
Toluene	T54	AR	1	µg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1	
EthylBenzene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1	
M/P Xylene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1	
O Xylene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1	
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<1	<1	<1	<1	<1	
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	
TPH (C10-C12 aliphatic)	T8	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1	
TPH (C12-C16 aliphatic)	T8	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1	
TPH (C16-C21 aliphatic)	T8	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1	
TPH (C21-C35 aliphatic)	T8	M105	1	mg/kg	(13) 3	(13) 3	(13) 1	(13) 2	(13) 2	
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	
TPH (C10-C12 aromatic)	T8	M105	1	mg/kg	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1	
TPH (C12-C16 aromatic)	T8	M105	1	mg/kg	(13) <1	(13) 1	(13) <1	(13) <1	(13) <1	
TPH (C16-C21 aromatic)	T8	M105	1	mg/kg	(13) 1	(13) 2	(13) <1	(13) <1	(13) <1	
TPH (C21-C35 aromatic)	T8	M105	1	mg/kg	(13) <1	(13) 1	(13) <1	(13) <1	(13) <1	

Customer Reference: B041466.002/GB/7047

Total and Speciated USEPA16 PAH

Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	0.2	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	0.2	⁽⁹⁾ <1.0	<0.1	1.0	<0.1
Pyrene	T207	M105	0.1	mg/kg	0.2	1.2	<0.1	1.0	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	0.1	⁽⁹⁾ <1.0	<0.1	0.6	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	0.4	<0.1
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	0.2	⁽⁹⁾ <1.0	<0.1	1.0	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	0.5	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	0.3	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	⁽⁹⁾ <1.0	<0.1	0.4	<0.1
PAH(total)	T207	M105	0.1	mg/kg	0.7	1.2	<0.1	5.4	<0.1

Customer Reference: B041466.002/GB/7047

Total and Speciated USEPA16 PAH

Determinand	Method	Test Sample	LOD	Units	
Naphthalene	T207	M105	0.1	mg/kg	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	0.4
Pyrene	T207	M105	0.1	mg/kg	0.3
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	0.2
Chrysene	T207	M105	0.1	mg/kg	0.2
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	0.4
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	0.2
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	0.1
PAH(total)	T207	M105	0.1	mg/kg	1.9

Index to symbols used in 594674-1

Value	Description
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.

A40	Assisted dried < 40C
AR	As Received
N.D.	Not Detected
13	Results have been blank corrected.
9	LOD raised due to dilution of sample
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos was subcontracted to REC Asbestos

Method Index

Value	Description
T6	ICP/OES
T2	Grav
T8	GC/FID
T27	PLM
T7	Probe
T287	Calc TOC/0.58
T206	GC/FID (MCERTS)
T4	Colorimetry
T54	GC/MS (Headspace)
T162	Grav (1 Dec) (105 C)
T207	GC/MS (MCERTS)
T546	Colorimetry (CF)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Arsenic	T6	M40	2	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Cadmium	T6	M40	1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Chromium	T6	M40	1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Copper	T6	M40	1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Lead	T6	M40	1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Mercury	T6	M40	1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Nickel	T6	M40	1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Selenium	T6	M40	3	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Zinc	T6	M40	1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Asbestos ID	T27	AR			SU	001,003,005,007,009,011,013,015,017,019,021,023,025,027
Boron (water-soluble)	T6	AR	1	mg/kg	N	001-003,005,007-011,013-015,017-019,021,023-027
Chromium VI	T6	AR	1	mg/kg	N	001-003,005,007-011,013-015,017-019,021,023-027
Cyanide(Total)	T546	AR	1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
pH	T7	AR			M	001-003,005,007-011,013-015,017-019,021,023-027
Phenols(Mono)	T546	AR	1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Retained on 10mm sieve	T2	AR	0.1	%	N	001-003,005,007-011,013-015,017-019,021,023-027
Soil Organic Matter	T287	AR	0.1	%	N	001-003,005,007-011,013-015,017-019,021,023-027
SO4(Total)	T6	A40	0.01	%	N	001-003,005,007-011,013-015,017-019,021,023-027
Sulphide	T4	AR	10	mg/kg	N	001-003,005,007-011,013-015,017-019,021,023-027
Sulphur (total)	T6	A40	0.01	%	N	001-003,005,007-011,013-015,017-019,021,023-027
TPH (C8-C10)	T8	M105	1	mg/kg	U	002,008,010,014,018,024,026
TPH (C10-C12)	T206	M105	1	mg/kg	M	002,008,010,014,018,024,026
TPH (C12-C16)	T206	M105	1	mg/kg	M	002,008,010,014,018,024,026
TPH (C16-C21)	T206	M105	1	mg/kg	M	002,008,010,014,018,024,026
TPH (C21-C35)	T206	M105	1	mg/kg	M	002,008,010,014,018,024,026
Benzene	T54	AR	1	µg/kg	U	001,003,005,007,009,011,013,015,017,019,021,023,025,027
Toluene	T54	AR	1	µg/kg	U	001,003,005,007,009,011,013,015,017,019,021,023,025,027
EthylBenzene	T54	AR	1	µg/kg	U	001,003,005,007,009,011,013,015,017,019,021,023,025,027
M/P Xylene	T54	AR	1	µg/kg	U	001,003,005,007,009,011,013,015,017,019,021,023,025,027
O Xylene	T54	AR	1	µg/kg	U	001,003,005,007,009,011,013,015,017,019,021,023,025,027
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C10-C12 aliphatic)	T8	M105	1	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
TPH (C12-C16 aliphatic)	T8	M105	1	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C16-C21 aliphatic)	T8	M105	1	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C21-C35 aliphatic)	T8	M105	1	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C10-C12 aromatic)	T8	M105	1	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C12-C16 aromatic)	T8	M105	1	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C16-C21 aromatic)	T8	M105	1	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
TPH (C21-C35 aromatic)	T8	M105	1	mg/kg	N	001,003,005,007,009,011,013,015,017,019,021,023,025,027
Moisture @105C	T162	AR	0.1	%	N	001-003,005,007-011,013-015,017-019,021,023-027
Naphthalene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-003,005,007-011,013-015,017-019,021,023-027
Acenaphthene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Fluorene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Phenanthrene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Anthracene	T207	M105	0.1	mg/kg	U	001-003,005,007-011,013-015,017-019,021,023-027
Fluoranthene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Pyrene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Chrysene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-003,005,007-011,013-015,017-019,021,023-027
PAH(total)	T207	M105	0.1	mg/kg	U	001-003,005,007-011,013-015,017-019,021,023-027



Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 604633-1

Date of Report: 12-Oct-2016

Customer: Curtins Consulting Ltd.
Curtins Consulting
Quayside
40-58 Hotwell Road
Bristol
BS8 4UQ

Customer Contact: Mr Graham Behrens

Customer Job Reference: B041466.002/GB/8065

Customer Purchase Order: EBMA209

Customer Site Reference: St Patricks Hall Reading University

Date Job Received at SAL: 03-Oct-2016

Date Analysis Started: 04-Oct-2016

Date Analysis Completed: 12-Oct-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



1549

Report checked
and authorised by :
Bianca Prince
Customer Service Manager

Issued by :
Bianca Prince
Customer Service Manager



SAL Reference: 604633 Project Site: St Patricks Hall Reading University Customer Reference: B041466.002/GB/8065									
Water Heavy Metals(9)					Analysed as Water				
SAL Reference					604633 001	604633 002	604633 003	604633 004	604633 005
Customer Sample Reference					BH1	BH2	BH3	BH4	BH7
Date Sampled					29-SEP-2016	29-SEP-2016	29-SEP-2016	29-SEP-2016	29-SEP-2016
Determinand	Method	Test Sample	LOD	Units					
As (Dissolved)	T281	AR	0.2	µg/l	0.4	0.4	0.2	0.3	<0.2
Cd (Dissolved)	T281	AR	0.02	µg/l	0.10	0.08	0.05	0.04	0.03
Cr (Dissolved)	T281	AR	1	µg/l	<1	<1	2	<1	4
Cu (Dissolved)	T281	AR	0.5	µg/l	3.0	1.7	1.6	1.3	1.4
Pb (Dissolved)	T281	AR	0.3	µg/l	<0.3	<0.3	<0.3	<0.3	<0.3
Hg (Dissolved)	T281	AR	0.05	µg/l	<0.05	<0.05	<0.05	<0.05	<0.05
Ni (Dissolved)	T281	AR	1	µg/l	6	6	4	4	2
Se (Dissolved)	T281	AR	0.5	µg/l	1.0	0.9	0.6	<0.5	2.3
Zn (Dissolved)	T281	AR	2	µg/l	350	390	<2	<2	<2

SAL Reference: 604633 Project Site: St Patricks Hall Reading University Customer Reference: B041466.002/GB/8065									
Water Curtins Water Suite 1					Analysed as Water				
SAL Reference					604633 001	604633 002	604633 003	604633 004	604633 005
Customer Sample Reference					BH1	BH2	BH3	BH4	BH7
Date Sampled					29-SEP-2016	29-SEP-2016	29-SEP-2016	29-SEP-2016	29-SEP-2016
Determinand	Method	Test Sample	LOD	Units					
B (Dissolved)	T373	AR	0.01	mg/l	0.06	0.11	0.10	0.09	0.06
Cyanide(Total)	T4	AR	0.05	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05
Hardness expressed as CaCO3	T6	AR	10	mg/l	200	250	310	190	300
pH	T7	AR			7.2	6.9	7.1	7.1	7.4
Sulphate	T686	F	0.5	mg/l	22	26	76	12	93
Sulphide	T4	AR	0.05	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05

SAL Reference: 604633 Project Site: St Patricks Hall Reading University Customer Reference: B041466.002/GB/8065									
Water BTEX GRO MTBE					Analysed as Water				
SAL Reference					604633 001	604633 002	604633 003	604633 004	604633 005
Customer Sample Reference					BH1	BH2	BH3	BH4	BH7
Date Sampled					29-SEP-2016	29-SEP-2016	29-SEP-2016	29-SEP-2016	29-SEP-2016
Determinand	Method	Test Sample	LOD	Units					
Benzene	T54	AR	1	µg/l	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
Toluene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
EthylBenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
M/P Xylene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
O Xylene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/l	<1	<1	<1	<1	<1
TPH (C6-C10)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010

SAL Reference: 604633									
Project Site: St Patricks Hall Reading University									
Customer Reference: B041466.002/GB/8065									
Water					Analysed as Water				
TPH (CWG)									
SAL Reference					604633 001	604633 002	604633 003	604633 004	604633 005
Customer Sample Reference					BH1	BH2	BH3	BH4	BH7
Date Sampled					29-SEP-2016	29-SEP-2016	29-SEP-2016	29-SEP-2016	29-SEP-2016
Determinand	Method	Test Sample	LOD	Units					
TPH (C5-C6 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C6-C8 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH DW(C10-C12 aliphatic)	T81	AR	0.01	mg/l	(13) <0.01	(13,100) <0.02	(13,100) <0.02	(100,13) <0.02	(100,13) <0.02
TPH DW(C12-C16 aliphatic)	T81	AR	0.01	mg/l	(13) <0.01	(13,100) <0.02	(100,13) <0.02	(100,13) <0.02	(13,100) <0.02
TPH DW(C16-C21 aliphatic)	T81	AR	0.01	mg/l	(13) <0.01	(100,13) <0.02	(100,13) <0.02	(100,13) <0.02	(13,100) <0.02
TPH DW(C21-C35 aliphatic)	T81	AR	0.01	mg/l	(13) 0.04	(13) 0.40	(13,100) <0.02	(13,100) <0.02	(100,13) <0.02
TPH (Aliphatic) total	T85	AR		mg/l	(13) 0.04	(13) 0.40	(13,100) <0.02	(100,13) <0.02	(13,100) <0.02
TPH (C6-C7 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T215	AR	0.010	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH DW(C10-C12 aromatic)	T81	AR	0.01	mg/l	(13) <0.01	(13,100) <0.02	(13,100) <0.02	(100,13) <0.02	(100,13) <0.02
TPH DW(C12-C16 aromatic)	T81	AR	0.01	mg/l	(13) <0.01	(100,13) <0.02	(13,100) <0.02	(13,100) <0.02	(13,100) <0.02
TPH DW(C16-C21 aromatic)	T81	AR	0.01	mg/l	(13) <0.01	(100,13) <0.02	(100,13) <0.02	(13,100) <0.02	(100,13) <0.02
TPH DW(C21-C35 aromatic)	T81	AR	0.01	mg/l	(13) <0.01	(100,13) <0.02	(100,13) <0.02	(13,100) <0.02	(100,13) <0.02
TPH (Aromatic) total	T85	AR		ma/l	(13) <0.01	(100,13) <0.02	(13,100) <0.02	(13,100) <0.02	(13,100) <0.02

SAL Reference: 604633									
Project Site: St Patricks Hall Reading University									
Customer Reference: B041466.002/GB/8065									
Water					Analysed as Water				
Total and Speciated USEPA16 PAH									
SAL Reference					604633 001	604633 002	604633 003	604633 004	604633 005
Customer Sample Reference					BH1	BH2	BH3	BH4	BH7
Date Sampled					29-SEP-2016	29-SEP-2016	29-SEP-2016	29-SEP-2016	29-SEP-2016
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
Acenaphthylene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
Acenaphthene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) 0.01	(13) <0.01	(13) <0.01
Fluorene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
Phenanthrene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
Anthracene	T149	AR	0.01	µg/l	(13) <0.01	(13) 0.01	(13) <0.01	(13) <0.01	(13) 0.01
Fluoranthene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) 0.01	(13) <0.01	(13) <0.01
Pyrene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) 0.01	(13) <0.01	(13) <0.01
Benzo(a)Anthracene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
Chrysene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
Benzo(b/k)Fluoranthene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
Benzo(a)Pyrene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01	(13) <0.01
PAH(total)	T149	AR	0.01	uo/l	(13) <0.01	(13) 0.01	(13) 0.03	(13) <0.01	(13) 0.01

Index to symbols used in 604633-1

Value	Description
F	Filtered
AR	As Received
100	LOD determined by sample aliquot used for analysis
13	Results have been blank corrected.
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T4	Colorimetry
T54	GC/MS (Headspace)
T686	Discrete Analyser
T81	GC/FID (LV)
T6	ICP/OES
T215	GC/MS (Headspace)(LV)
T85	Calc
T149	GC/MS (SIR)
T281	ICP/MS (Filtered)
T7	Probe
T373	ICP/OES (Filtered)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
B (Dissolved)	T373	AR	0.01	mg/l	N	001-005
Cyanide(Total)	T4	AR	0.05	mg/l	U	001-005
Hardness expressed as CaCO3	T6	AR	10	mg/l	N	001-005
pH	T7	AR			U	001-005
Sulphate	T686	F	0.5	mg/l	U	001-005
Sulphide	T4	AR	0.05	mg/l	N	001-005
Naphthalene	T149	AR	0.01	µg/l	U	001-005
Acenaphthylene	T149	AR	0.01	µg/l	U	001-005
Acenaphthene	T149	AR	0.01	µg/l	U	001-005
Fluorene	T149	AR	0.01	µg/l	U	001-005
Phenanthrene	T149	AR	0.01	µg/l	U	001-005
Anthracene	T149	AR	0.01	µg/l	U	001-005
Fluoranthene	T149	AR	0.01	µg/l	U	001-005
Pyrene	T149	AR	0.01	µg/l	U	001-005
Benzo(a)Anthracene	T149	AR	0.01	µg/l	U	001-005
Chrysene	T149	AR	0.01	µg/l	U	001-005
Benzo(b/k)Fluoranthene	T149	AR	0.01	µg/l	U	001-005
Benzo(a)Pyrene	T149	AR	0.01	µg/l	U	001-005
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	U	001-005
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	U	001-005
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	U	001-005
PAH(total)	T149	AR	0.01	µg/l	U	001-005
As (Dissolved)	T281	AR	0.2	µg/l	U	001-005
Cd (Dissolved)	T281	AR	0.02	µg/l	U	001-005
Cr (Dissolved)	T281	AR	1	µg/l	U	001-005
Cu (Dissolved)	T281	AR	0.5	µg/l	U	001-005
Pb (Dissolved)	T281	AR	0.3	µg/l	U	001-005
Hg (Dissolved)	T281	AR	0.05	µg/l	U	001-005
Ni (Dissolved)	T281	AR	1	µg/l	U	001-005
Se (Dissolved)	T281	AR	0.5	µg/l	U	001-005
Zn (Dissolved)	T281	AR	2	µg/l	U	001-005
TPH (C5-C6 aliphatic)	T215	AR	0.010	mg/l	N	001-005
TPH (C6-C8 aliphatic)	T215	AR	0.010	mg/l	N	001-005
TPH (C8-C10 aliphatic)	T215	AR	0.010	mg/l	N	001-005
TPH DW(C10-C12 aliphatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C12-C16 aliphatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C16-C21 aliphatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C21-C35 aliphatic)	T81	AR	0.01	mg/l	N	001-005
TPH (Aliphatic) total	T85	AR		mg/l	N	001-005
TPH (C6-C7 aromatic)	T215	AR	0.010	mg/l	N	001-005
TPH (C7-C8 aromatic)	T215	AR	0.010	mg/l	N	001-005
TPH (C8-C10 aromatic)	T215	AR	0.010	mg/l	N	001-005
TPH DW(C10-C12 aromatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C12-C16 aromatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C16-C21 aromatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C21-C35 aromatic)	T81	AR	0.01	mg/l	N	001-005
TPH (Aromatic) total	T85	AR		mg/l	N	001-005
Benzene	T54	AR	1	µg/l	U	001-005
Toluene	T54	AR	1	µg/l	U	001-005
EthylBenzene	T54	AR	1	µg/l	U	001-005
m/P Xylene	T54	AR	1	µg/l	U	001-005

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
O Xylene	T54	AR	1	µg/l	U	001-005
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	001-005
TPH (C6-C10)	T215	AR	0.010	mg/l	N	001-005



Appendix A6 – Gas Monitoring Results

Gas and Groundwater Monitoring Results

University of Reading, St Patricks Hall Redevelopment,
Reading

Job No: 52527

Figure No: A2.27

Background Readings:	Date of Visit		25.08.2016			
	CH ₄ %v/v	CO ₂ %v/v	O ₂ %v/v	H ₂ Sppm	COppm	VOC ppm
	0.1	0.0	20.8	0	0	NR
	Weather Conditions		Humid, cloudy with sunny spells			
	Ground Conditions (dry/wet etc.)		Damp			
	Atmospheric Pressure (mb)		1008			

Hole No:	Time (hh:mm)	Atmos. Pressure (mb)	Gas Flow Rate (l/hr)	CH ₄ % v/v		CO ₂ % v/v		O ₂ % v/v		H ₂ S ppm		CO ppm		VOC ppm		Water Level mBGL	Depth of Well mBGL	Water Sample Y / N
				Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady			
BH1	11:40	1007	0.0	0.1	0.1	1.1	1.1	19.4	19.4	0	0	0	0	NR	NR	2.28	10.09	N
BH2	11:20	1007	0.0	0.1	0.1	3.3	3.3	18.3	18.3	0	0	0	0	NR	NR	3.18	10.14	N
BH3	9:50	1008	0.1	0.1	0.1	2.0	2.0	15.6	15.6	0	0	0	0	NR	NR	2.54	9.80	N
BH4	9:30	1008	0.1	0.1	0.1	1.0	1.0	20.1	20.1	0	0	0	0	NR	NR	2.31	10.01	N
BH7	10:25	1007	0.1	0.1	0.1	3.5	3.5	17.5	17.5	0	0	0	0	NR	NR	4.86	10.12	N
WS1	11:30	1007	0.0	0.1	0.1	0.5	0.5	20.2	20.2	0	0	0	0	NR	NR	DRY	1.26	N
WS2	9:05	1008	0.2	0.1	0.1	2.8	2.8	19.0	19.0	0	0	0	0	NR	NR	DRY	1.76	N
WS3	9:20	1008	0.1	0.1	0.1	2.2	2.2	19.5	19.5	0	0	0	0	NR	NR	DRY	1.99	N
WS4	10:00	1008	0.0	0.1	0.1	1.0	1.0	20.0	20.0	0	0	0	0	NR	NR	DRY	1.57	N
WS5	11:10	1007	0.1	0.1	0.1	1.7	1.7	19.4	19.4	0	0	0	0	NR	NR	DRY	1.98	N

ND = Below detection limit of instrument. NR = Not Read.

Readings Taken By:

FA

Checked By:

BL

Background Readings:	Date of Visit 25.08.2016		Weather Conditions		Humid, cloudy with sunny spells	
	CH ₄ %v/v	CO ₂ %v/v	O ₂ %v/v	H ₂ S ppm	CO ppm	VOC ppm
	0.1	0.0	20.8	0	0	NR
	Ground Conditions (dry/wet etc.)		Damp			
	Atmospheric Pressure (mb)		1008			

Hole No:	Time (hh:mm)	Atmos. Pressure (mb)	Gas Flow Rate (l/hr)	CH ₄ % v/v		CO ₂ % v/v		O ₂ % v/v		H ₂ S ppm		CO ppm		VOC ppm		Water Level mBGL	Depth of Well mBGL	Water Sample Y / N
				Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady			
WS6	9:40	1008	0.1	0.1	0.1	2.3	2.3	18.2	18.2	0	0	0	0	NR	NR	DRY	1.95	N
WS7	11:00	1007	0.0	0.1	0.1	2.9	2.9	17.4	17.4	0	0	0	0	NR	NR	3.86	4.95	N
WS8	10:50	1007	0.0	0.1	0.1	2.4	2.4	16.8	16.8	0	0	0	0	NR	NR	3.53	3.77	N
WS9	10:40	1007	0.1	0.1	0.1	2.3	2.3	17.2	17.2	0	0	0	0	NR	NR	3.67	3.97	N
WS10	10:10	1007	0.0	0.1	0.1	2.7	2.7	18.6	18.6	0	0	0	0	NR	NR	DRY	2.07	N

ND = Below detection limit of instrument. NR = Not Read.

Readings Taken By: FA

Checked By: BL

Gas and Groundwater Monitoring Results

University of Reading, St Patricks Hall Redevelopment,
Reading

Job No: 52527

Figure No: A2.27cont

Background Readings:	Date of Visit		29.09.2016	
	CH ₄ %v/v	CO ₂ %v/v	ND	ND
	O ₂ %v/v	20.3	ND	ND
	Weather Conditions		Drizzle/15 C/Slightly Windy	
	Ground Conditions (dry/wet etc.)		Wet	
		Atmospheric Pressure (mb)		1005

Hole No:	Time (hh:mm)	Atmos. Pressure (mb)	Gas Flow Rate (l/hr)	CH ₄ % v/v		CO ₂ % v/v		O ₂ % v/v		H ₂ S ppm		CO ppm		VOC ppm		Water Level mBGL	Depth of Well mBGL	Water Sample Y / N
				Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady			
BH1	13:07	1006	ND	ND	ND	1.4	1.4	19.2	19.3	ND	ND	ND	ND	NR	NR	2.10	10.06	Y
BH2	11:46	1003	ND	ND	ND	2.9	2.9	17.9	17.9	ND	ND	ND	ND	NR	NR	2.18	10.07	Y
BH3	11:38	1005	ND	ND	ND	3.1	3.1	12.0	12.0	ND	ND	ND	ND	NR	NR	2.03	9.75	Y
BH4	11:24	1005	ND	ND	ND	2.2	2.2	18.6	18.7	ND	ND	ND	ND	NR	NR	2.50	10.00	Y
BH7	12:28	1004	ND	ND	ND	4.9	4.8	16.3	16.3	ND	ND	ND	ND	NR	NR	4.54	10.05	Y
WS1	11:51	1003	ND	ND	ND	0.7	0.5	19.8	19.8	ND	ND	ND	ND	NR	NR	DRY	1.26	N
WS2	11:57	1003	ND	ND	ND	2.1	2.1	18.9	18.9	ND	ND	ND	ND	NR	NR	DRY	1.73	N
WS3	11:32	1005	ND	ND	ND	1.6	1.4	19.3	19.3	ND	ND	ND	ND	NR	NR	DRY	1.98	N
WS4	11:41	1005	ND	ND	ND	0.8	0.8	19.5	19.7	ND	ND	ND	ND	NR	NR	DRY	0.95	N
WS5	11:18	1005	ND	ND	ND	0.9	0.9	19.4	19.4	ND	ND	ND	ND	NR	NR	DRY	1.97	N

ND = Below detection limit of instrument. NR = Not Read.

Readings Taken By:

MC

Checked By:

DA

Gas and Groundwater Monitoring Results

University of Reading, St Patricks Hall Redevelopment,
Reading

Job No: 52527

Figure No: A2.27cont

Background Readings:	Date of Visit 29.09.2016											
	CH ₄ %v/v	ND	CO ₂ %v/v	ND	O ₂ %v/v	20.3	H ₂ Sppm	ND	COppm	ND	VOC ppm	NR
	Weather Conditions				Drizzle/15 C/Slightly Windy							
	Ground Conditions (dry/wet etc.)				Wet							
	Atmospheric Pressure (mb)				1005							

Hole No:	Time (hh:mm)	Atmos. Pressure (mb)	Gas Flow Rate (l/hr)	CH ₄ % v/v		CO ₂ % v/v		O ₂ % v/v		H ₂ S ppm		CO ppm		VOC ppm		Water Level mBGL	Depth of Well mBGL	Water Sample Y / N
				Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady			
WS6	13:52	1008	ND	0.1	0.0	0.5	0.5	19.8	19.8	ND	ND	ND	ND	NR	NR	DRY	1.95	N
WS7	11:10	1005	ND	ND	ND	3.9	3.8	16.0	16.0	ND	ND	ND	ND	NR	NR	3.20	4.95	N
WS8	11:04	1005	ND	ND	ND	1.3	1.3	19.0	19.0	ND	ND	ND	ND	NR	NR	2.96	3.70	N
WS9	10:55	1005	ND	ND	ND	4.8	4.7	16.5	16.5	ND	ND	ND	ND	NR	NR	3.89	4.01	N
WS10	12:47	1006	ND	ND	ND	2.9	2.9	18.1	18.1	ND	ND	ND	ND	NR	NR	DRY	2.07	N

ND = Below detection limit of instrument. NR = Not Read.

Readings Taken By:

MC

Checked By:

DA

Appendix A7 - Tier 1 Thresholds

- Tier 1 Thresholds '*Residential without the Consumption of Produce*' 1% SOM
- Tier 1 Water Thresholds

Tier 1 Thresholds



Soil Contaminants: Initial Assessment of Risk

The following tables can be used for the initial assessment with regard to the potential for the identified contaminants within a sandy matrix with an average Soil Organic Matter (SOM) content of 1% to present a risk of significant harm to the **'Residential without the Consumption of Produce'** end user.

The list of determinands is non-industry specific and it should be recognised that additional site specific determinands may need to be accounted for.

Table 1.0 Inorganic Species and Phenols

Contaminants	Threshold Trigger Concentration For Planned End Use	
	Source (ref. 1)	Value (mg/kg)
Antimony	ATRISK ^{soil} Soil Screening Value	394
Arsenic	C4SL	37
Arsenic	ATRISK ^{soil} Soil Screening Value	35
Beryllium	ATRISK ^{soil} Soil Screening Value	94.7
Boron	Recognised threshold to prevent phytotoxic affects	3
Cadmium	C4SL	26
Chromium (VI)	C4SL	21
Cadmium	ATRISK ^{soil} Soil Screening Value	83.6
Chromium (VI)	ATRISK ^{soil} Soil Screening Value	38.1
Copper	ATRISK ^{soil} Soil Screening Value	8370
Cyanide (Free)	ATRISK ^{soil} Soil Screening Value	34
Lead	Currently Accepted Threshold	450
Mercury	ATRISK ^{soil} Soil Screening Value	0.06 ; 238 ; 7
Nickel	CLEA SGV for residential end use published May 09	130
Selenium	ATRISK ^{soil} Soil Screening Value	595
Sulphate	Recognised threshold for protection of sub-surface concrete	2400
Sulphur (Free)	Recognised threshold for all end uses	5000
Sulphide	Recognised threshold for all end uses	250
Vanadium	ATRISK ^{soil} Soil Screening Value	353
Zinc	ATRISK ^{soil} Soil Screening Value	46800
pH	Typical value in uncontaminated soils	6-8
Phenol	Recognised threshold for protection of services (ref. 3)	5

1. The tables are for guidance only and must be read in conjunction with relevant source documentation.
2. Three values correspond to: elemental mercury (Hg); inorganic mercury (Hg²⁺) and methyl mercury (Hg⁺⁴).
3. For human health consider using ATRISK^{soil} Soil Screening Value of 262mg/kg.

Table 1.1 BTEX Species

Contaminants	Threshold Trigger Concentration For Planned End Use	
	Source	Value (mg/kg)
Benzene	C4SL	0.20
Toluene	ATRISK ^{soil} Soil Screening Value	219
Ethylbenzene	ATRISK ^{soil} Soil Screening Value	59.7

Tier 1 Thresholds



Soil Contaminants: Initial Assessment of Risk

m-Xylene	ATRISK ^{soil} Soil Screening Value	19.7
o-Xylene	ATRISK ^{soil} Soil Screening Value	21.1
p-Xylene	ATRISK ^{soil} Soil Screening Value	18.9

Table 1.2 PAH Species

Contaminants	Threshold Trigger Concentration For Planned End Use	
	Source	Value (mg/kg)
Acenaphthene	ATRISK ^{soil} Soil Screening Value (ref. 4)	4710
Anthracene	ATRISK ^{soil} Soil Screening Value (ref. 4)	22000
Benz(a)anthracene	ATRISK ^{soil} Soil Screening Value (ref. 4)	5.42
Benzo(a)pyrene	C4SL	5
Benzo(b)fluoranthene	ATRISK ^{soil} Soil Screening Value (ref. 4)	9.68
Benzo(ghi)perylene	ATRISK ^{soil} Soil Screening Value (ref. 4)	102
Benzo(k)fluoranthene	ATRISK ^{soil} Soil Screening Value (ref. 4)	99.7
Chrysene	ATRISK ^{soil} Soil Screening Value (ref. 4)	852
Dibenz(ah)anthracene	ATRISK ^{soil} Soil Screening Value (ref. 4)	0.949
Fluoranthene	ATRISK ^{soil} Soil Screening Value (ref. 4)	3110
Fluorene	ATRISK ^{soil} Soil Screening Value (ref. 4)	3180
Indeno(123cd)pyrene	ATRISK ^{soil} Soil Screening Value (ref. 4)	9.53
Naphthalene	ATRISK ^{soil} Soil Screening Value	0.598
Pyrene	ATRISK ^{soil} Soil Screening Value (ref. 4)	2330

4. Where free product is not observed, otherwise consider revising.

Table 1.3 Total Petroleum Hydrocarbon (TPH) Bandings (All values in mg/kg)

Carbon Range	Threshold Trigger Concentration For Planned End Use		
	Source	Aromatic	Aliphatic
C5 – C6	ATRISK ^{soil} Soil Screening Value (ref. 5)	0.0925 (C5-C7)	30.2
C6 – C8	ATRISK ^{soil} Soil Screening Value (ref. 6)	219 (C7-C8)	70
C8 – C10	ATRISK ^{soil} Soil Screening Value	16	9.8
C10 – C12	ATRISK ^{soil} Soil Screening Value	97.1	1750 (ref. 4)
C12 – C16	ATRISK ^{soil} Soil Screening Value	1800 (ref. 4)	5210 (ref. 4)
C16 – C21	ATRISK ^{soil} Soil Screening Value	1330	146000
C21 – C35	ATRISK ^{soil} Soil Screening Value	1330	

5. Based on total benzene concentration in the soil.

6. Based on total toluene concentration in the soil.

ATRISK^{soil} Soil Screening Values are published by Atkins Limited

Tier 1 Thresholds

Water Contaminants: Initial Assessment of Risk

The following tables can be used for the initial assessment with regard to the potential for the identified contaminants within groundwater or surface water to present a risk of significant harm to sensitive controlled water receptors (e.g. aquifers, public supply boreholes).

The list of determinands is non-industry specific and it should be recognised that additional site specific determinands may need to be accounted for.

Table 1: Inorganic Tier 1 Water Environment Screening Criteria

Contaminant	Units	Hardness Banding (CaCO ₃)	EQS (Freshwater)	EQS (Saltwater)	UK DWS	WHO
Inorganics						
Arsenic	µg/l	-	50	25	10	10
Boron	µg/l	-	2000	7000	1000	0.3
Cadmium	µg/l	-	5	2.5	5	3
Chromium	µg/l	0 – 50	2	15	50	50
		50 – 100	10			
		100 – 150	10			
		150 – 200	20			
		200 – 250	20			
Copper	µg/l	0 – 10	0.5	5	2000	2000
		10 – 50	0.5			
		50 – 200	3			
		200 – 250	8			
		> 250	12			
Cyanide (Free)	µg/l	-	1	-	-	-
Cyanide	µg/l	-	-	-	50	70
Iron	µg/l	-	1000	1000	200	300
Lead	µg/l	0 – 50	4	25	10	10
		50 – 150	10			
		150 – 250	20			
		>250	20			
Mercury	µg/l	-	1	0.3	1	1
Nickel	µg/l	0 – 50	8	30	20	70
		50 – 100	20			
		100-150	20			
		150 – 250	40			
		>250	40			
Selenium	µg/l	-	-	-	10	10
Zinc	µg/l	0 – 50	8	40	5000	3000
		50 – 150	15			
		150 - 250	50			
		>250	50			

Tier 1 Thresholds

Water Contaminants: Initial Assessment of Risk

Table 2: Organic Tier 1 Water Environmental Screening Criteria

Contaminant	Units	EQS (Freshwater)	EQS (Saltwater)	UK DWS	WHO
Organics					
Phenol (total)	µg/l	30	30	0.5	-
MTBE	µg/l	-	-	-	15
Total Petroleum Hydrocarbons (TPH)					
Aliphatic C5-C6	µg/l	-	-	-	15000
Aliphatic C6-C8	µg/l	-	-	-	15000
Aliphatic C8-C10	µg/l	-	-	-	300
Aliphatic C10-C12	µg/l	-	-	-	300
Aliphatic C12-C16	µg/l	-	-	-	300
Aliphatic C16-C21	µg/l	-	-	-	300
Aliphatic C21-C35	µg/l	-	-	-	300
Aromatic C6-C7	µg/l	-	-	1 (benzene)	10 (benzene)
Aromatic C7-C8	µg/l	50 (toluene)	-	-	700 (toluene)
Aromatic C8-C10	µg/l	20 (ethyl benzene)	-	-	300 (ethyl benzene)
Aromatic C10-C12	µg/l	-	-	-	100
Aromatic C12-C16	µg/l	-	-	-	100
Aromatic C16-C21	µg/l	-	-	-	90
Aromatic C21-C35	µg/l	-	-	-	90
Hydrocarbons (Dissolved / Emulsion)	µg/l	-	-	10 (revoked)	300
BTEX Compounds					
Benzene	µg/l	30	30	1	10
Toluene	µg/l	50	40	-	-
Ethyl-benzene	µg/l	20	-	-	-
Xylene	µg/l	30	30	-	-
Polycyclic Aromatic Hydrocarbons (PAH)					
Anthracene	µg/l	0.02	0.02	-	-
Benzo(a)pyrene	µg/l	0.03	0.03	0.01	0.01
Fluoranthene	µg/l	0.02	0.02	-	-
Napthalene	µg/l	10	-	-	-
PAHs Sum of four- <i>benzo(b)fluoranthene</i> <i>benzo(ghi)perylene</i> <i>benzo(k)fluoranthene</i> <i>indeno(1,2,3-c,d)pyrene</i>	µg/l	-	-	0.1	-

Appendix A8 – Qualitative/Quantitative Risk Assessment Rationale

The site-specific qualitative/quantitative risk assessment of environmental harm, as detailed in Sections 3.0 and 8.0 of this reporting, is summarised in Table A8.1 hereafter; the principle being to establish whether connecting links exist between a hazardous source to a potential receptor via an exposure pathway.

The qualitative/quantitative risk assessment corresponds with the total site area and incorporates both descriptive (qualitative) and, where available, numerical (quantitative) lines of evidence.

Risk assessment is the process of collating known information on a hazard or set of hazards in order to estimate actual or potential risk to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem or future construction materials. Receptors can be connected to the hazardous source by one or several exposure pathways such as direct contact for example. Risks are generally managed by isolating the receptor or intercepting the exposure pathway or by isolating or removing the hazard.

Without the three essential components of a source, pathway and receptor there can be no risk. Therefore, the presence of hazard on a site does not necessarily mean there is a risk.

By considering where a viable pathway exists which connects a source with a receptor the risk assessment in Section 3.0 and Table A8.1 identifies where pollutant linkage exists. If there is no pollutant linkage there is no risk and only where a pollutant linkage is established does the risk assessment consider the level of risk.

The risk assessment considers the likelihood of a particular event taking place (accounting for the presence of the hazard and receptor and the integrity of the exposure pathway) in conjunction with the severity of the potential consequence (accounting for the potential severity of the hazard and the sensitivity of the receptor).

In the risk assessment the consequence of the hazard has been classified as severe or medium or mild or minor and the probability (likelihood) of the circumstances actually occurring classified as high likelihood or likely or low likelihood or unlikely.

The consequences and probabilities are subsequently cross-correlated to give a qualitative estimation of the risk using Department of the Environment risk classifications as detailed in the table below and as referenced in CIRIA C552.

		Consequence			
		Severe	Medium	Mild	Minor
Probability (Likelihood)	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

In accordance with DoE guidance, the following categorisation of **consequence** has been developed.

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem or organisation forming part of such ecosystem.	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of such ecosystem.	Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria. Leaching of contaminants from a site to a Principal or Unproductive aquifer. Death of a species within a designated nature reserve. Lesser toxic and asphyxiate effects
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater (inc. Secondary B aquifers). Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

In accordance with DoE guidance, the following categorisation of **probability** has been developed.

Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

In accordance with DoE guidance, the following categorisation of **risk** has been developed.

Classification	Definition
Very High Risk	There is a <i>high probability</i> that <i>severe harm</i> could arise to a designated receptor from an identified hazard at the site without appropriate further action.
High Risk	<i>Harm is likely to arise</i> to a designated receptor from an identified hazard at the site without appropriate further action.
Moderate Risk	<i>It is possible</i> that without appropriate further action <i>harm could arise</i> to a designated receptor. It is relatively <i>unlikely</i> that any such harm would be <i>severe</i> , and if any harm were to occur it is <i>more likely</i> that such harm would be <i>relatively mild</i> .
Low Risk	<i>It is possible</i> that <i>harm could arise</i> to a designated receptor from an identified hazard. It is <i>likely</i> that, at worst, if any harm was realised any effects would be <i>mild</i> .
Negligible Risk	The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

The term 'risk' in this instance refers to the risk that the source, pathway, receptor linkage for a given source of contamination is complete. It does not refer to immediate risk to individuals or features present on the site from potential contaminants and is intended to be used as a tool to assess the necessity of further investigation.

Our Locations

Birmingham

2 The Wharf
Bridge Street
Birmingham
B1 2JS
T. 0121 643 4694
birmingham@curtins.com

Bristol

Quayside
40-58 Hotwell Road
Bristol
BS8 4UQ
T. 0117 302 7560
bristol@curtins.com

Cardiff

3 Cwrt-y-Parc
Earlswood Road
Cardiff
CF14 5GH
T. 029 2068 0900
cardiff@curtins.com

Douglas

Varley House
29-31 Duke Street
Douglas
Isle of Man
IM1 2AZ
T. 01624 624 585
douglas@curtins.com

Dublin

39 Fitzwilliam Square
Dublin 2
Ireland
T. 00353 1 507 9447
dublin@curtins.com

Edinburgh

1a Belford Road
Edinburgh
EH4 3BL
T. 0131 225 2175
edinburgh@curtins.com

Glasgow

Queens House
29 St Vincent Place
Glasgow
G1 2DT
T. 0141 319 8777
glasgow@curtins.com

Kendal

28 Lowther Street
Kendal
Cumbria
LA9 4DH
T. 01539 724 823
kendal@curtins.com

Leeds

Rose Wharf
Ground Floor
Leeds
L29 8EE
T. 0113 274 8509
leeds@curtins.com

Liverpool

Curtin House
Columbus Quay
Riverside Drive
Liverpool
L3 4DB
T. 0151 726 2000
liverpool@curtins.com

London

40 Compton Street
London
EC1V 0BD
T. 020 7324 2240
london@curtins.com

Manchester

Merchant Exchange
17-19 Whitworth Street West
Manchester
M1 5WG
T. 0161 236 2394
manchester@curtins.com

Nottingham

56 The Ropewalk
Nottingham
NG1 5DW
T. 0115 941 5551
nottingham@curtins.com