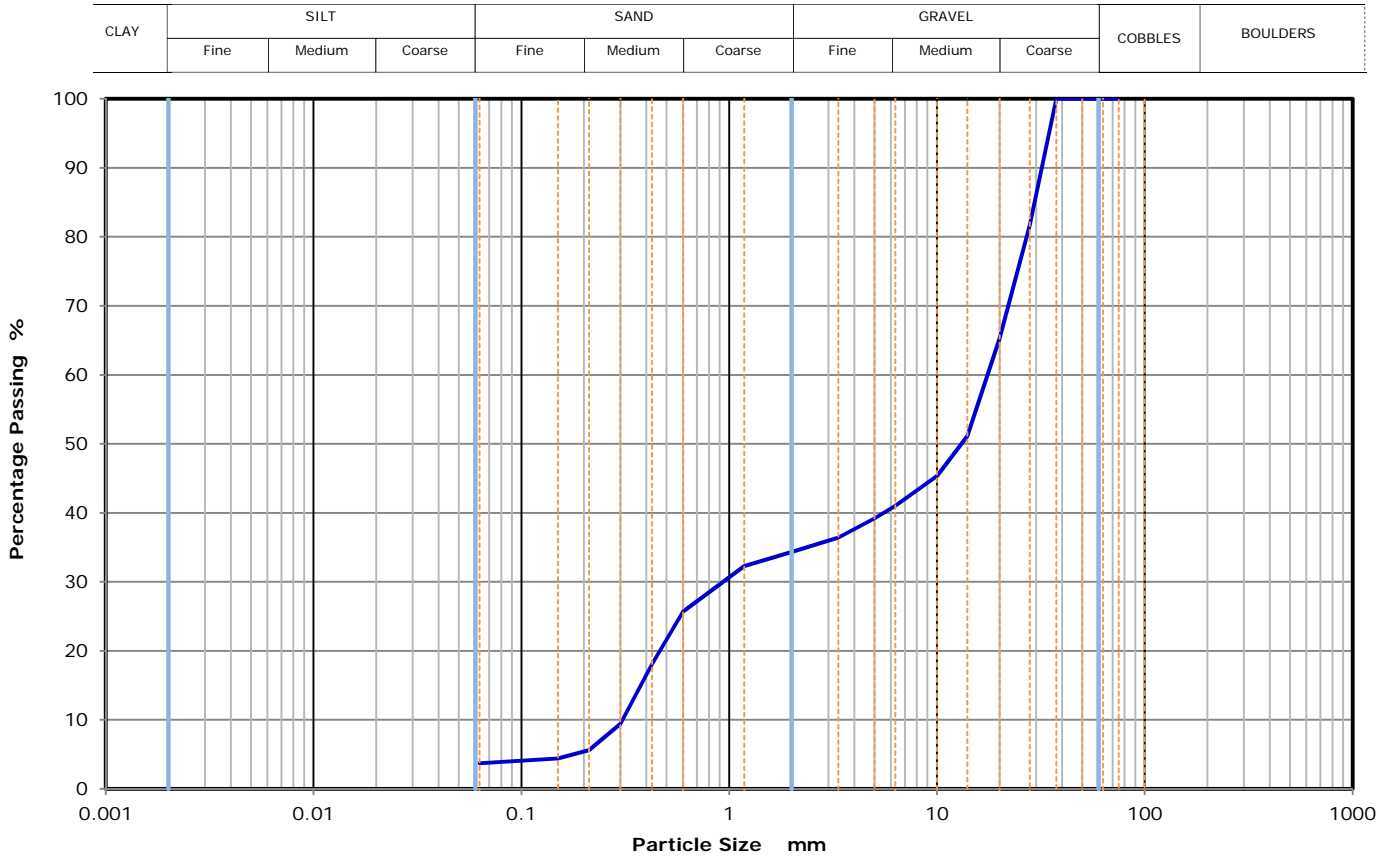


### PARTICLE SIZE DISTRIBUTION

Hole ID: <b>BH2B</b> Depth [m]: <b>3.00</b>	Description: <b>Orangish brown slightly silty very sandy GRAVEL</b>
--	---



Sieving	
Size [mm]	% passing
75	100
63	100
50	100
37.5	100
28	81.7
20	65.3
14	51.1
10	45.3
6.3	41
5	39.2
3.35	36.4
2	34.3
1.18	32.3
0.6	25.7
0.425	18.1
0.3	9.4
0.212	5.6
0.15	4.4
0.063	3.7

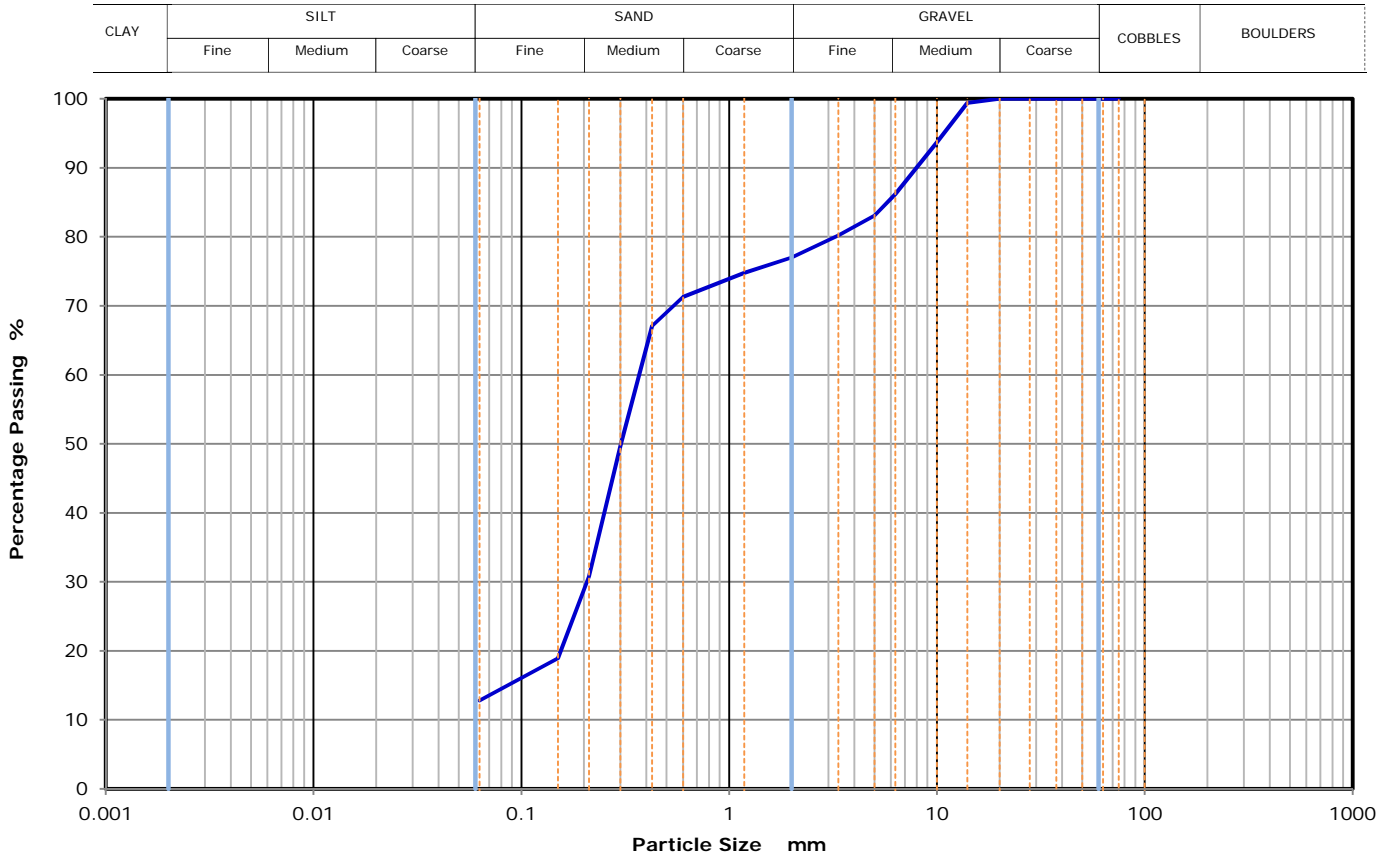
Sample proportions	%
Cobbles	0
Gravel	66
Sand	31
Fines <0.063mm	4

Grading analysis		
D60	mm	17.5
D30	mm	0.9
D10	mm	0.3
Uniformity Coefficient		57.0
Curvature Coefficient		0.2

Test method and date	
Testing in accordance with BS EN ISO 17892:	
Wet sieving method	
Reporting date:	08 Nov 16

## PARTICLE SIZE DISTRIBUTION

Hole ID: <b>WS1</b> Depth [m]: <b>3.00</b>	Description: <b>Orangish brown silty very gravelly SAND</b>
---	---



Sieving	
Size [mm]	% passing
75	100
63	100
50	100
37.5	100
28	100
20	100
14	99.4
10	93.7
6.3	86.2
5	83.1
3.35	80.2
2	77
1.18	74.8
0.6	71.3
0.425	67.1
0.3	49.7
0.212	30.8
0.15	18.9
0.063	12.8

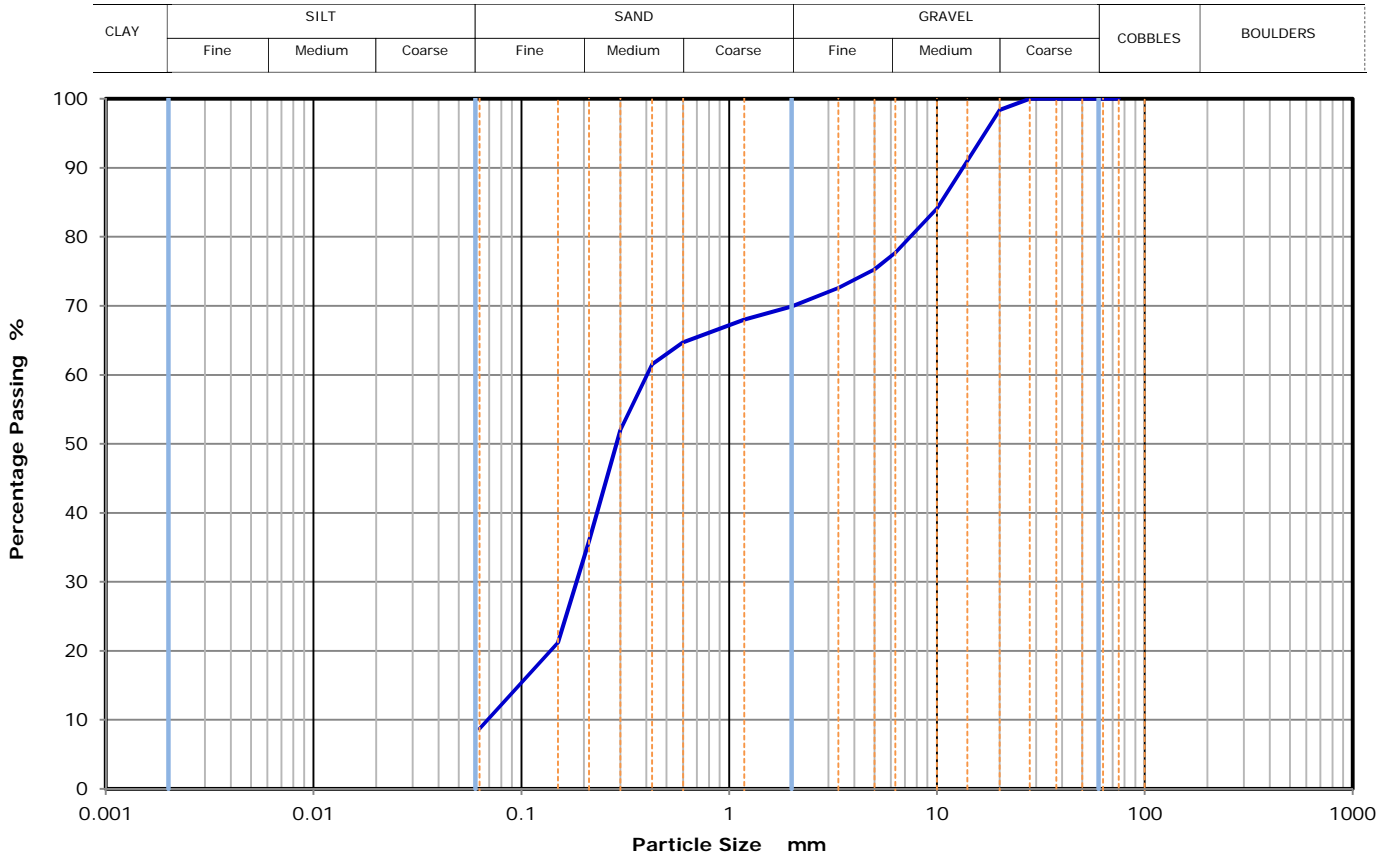
Sample proportions	%
Cobbles	0
Gravel	23
Sand	64
Fines <0.063mm	13

Grading analysis		
D60	mm	0.4
D30	mm	0.2
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Test method and date	
Testing in accordance with BS EN ISO 17892:	
Wet sieving method	
Reporting date:	08 Nov 16

### PARTICLE SIZE DISTRIBUTION

Hole ID: <b>WS3</b>	Description: <b>Orangish brown silty very gravelly SAND</b>
Depth [m]: <b>1.60</b>	



Sieving	
Size [mm]	% passing
75	100
63	100
50	100
37.5	100
28	100
20	98.4
14	91
10	84.1
6.3	77.7
5	75.3
3.35	72.6
2	69.9
1.18	68
0.6	64.7
0.425	61.5
0.3	52
0.212	35.9
0.15	21.2
0.063	8.7

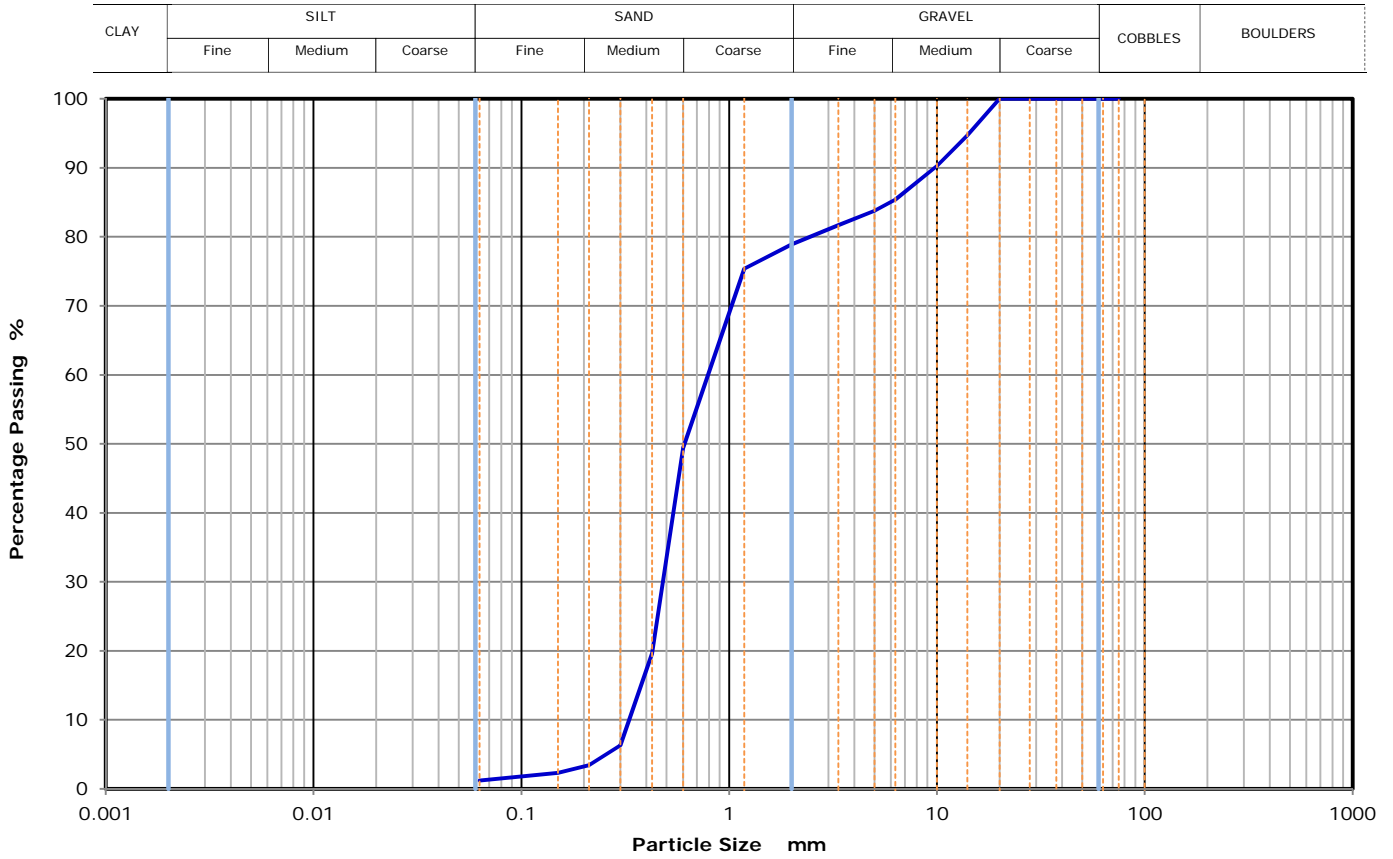
Sample proportions	%
Cobbles	0
Gravel	30
Sand	61
Fines <0.063mm	9

Grading analysis		
D60	mm	0.4
D30	mm	0.2
D10	mm	0.1
Uniformity Coefficient		5.8
Curvature Coefficient		1.2

Test method and date	
Testing in accordance with BS EN ISO 17892:	
Wet sieving method	
Reporting date:	08 Nov 16

## PARTICLE SIZE DISTRIBUTION

Hole ID: <b>WS5</b> Depth [m]: <b>4.60</b>	Description: <b>Orangish brown slightly silty very sandy GRAVEL</b>
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Sieving	
Size [mm]	% passing
75	100
63	100
50	100
37.5	100
28	100
20	100
14	94.7
10	90.3
6.3	85.4
5	83.8
3.35	81.7
2	78.9
1.18	75.4
0.6	49.4
0.425	19.6
0.3	6.3
0.212	3.4
0.15	2.3
0.063	1.2

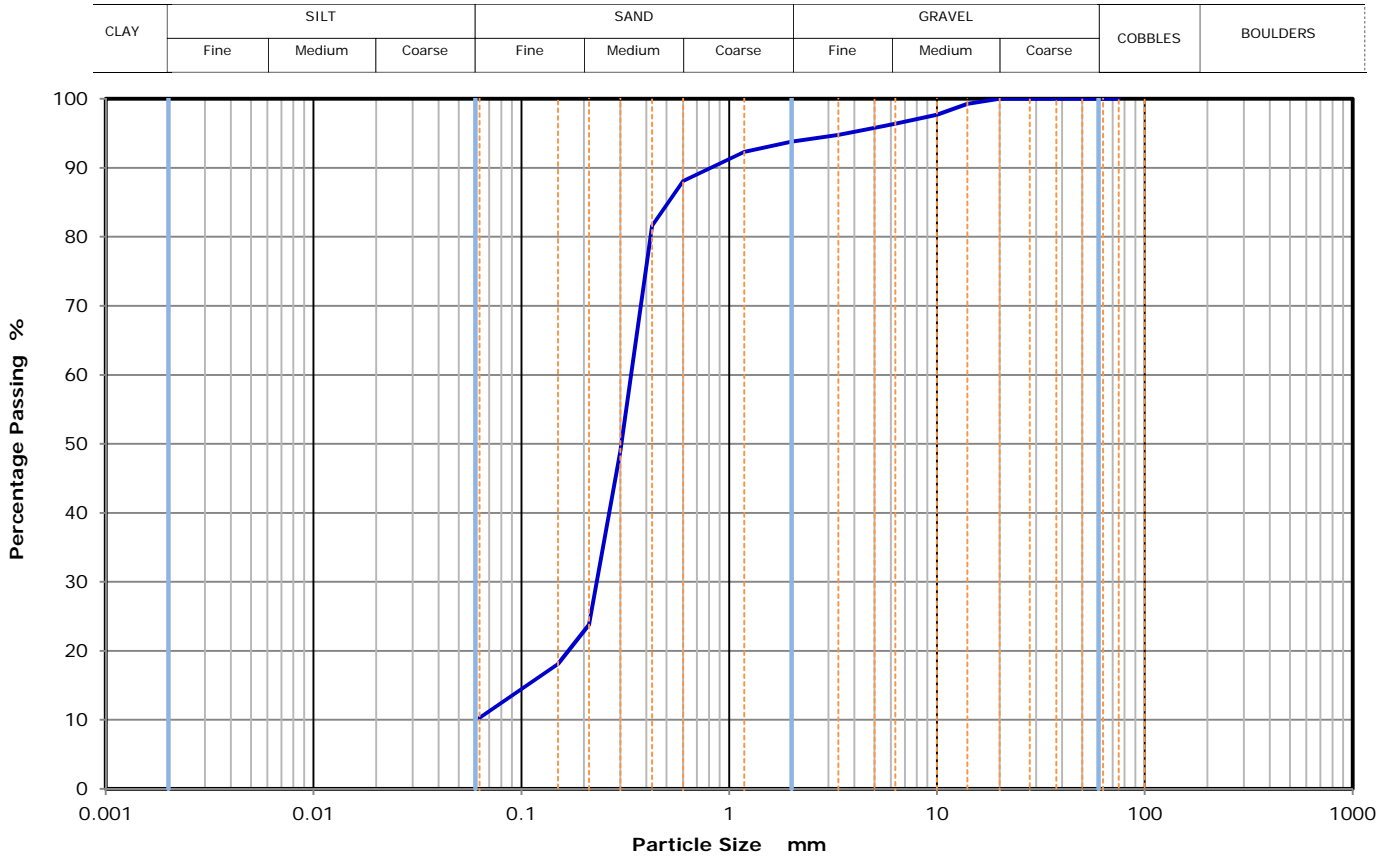
Sample proportions	%
Cobbles	0
Gravel	21
Sand	78
Fines <0.063mm	1

Grading analysis		
D60	mm	0.8
D30	mm	0.5
D10	mm	0.3
Uniformity Coefficient		2.4
Curvature Coefficient		0.9

Test method and date	
Testing in accordance with BS EN ISO 17892:	
Wet sieving method	
Reporting date:	08 Nov 16

## PARTICLE SIZE DISTRIBUTION

Hole ID: <b>WS9A</b> Depth [m]: <b>2.50</b>	Description: <b>Light brown silty gravelly SAND</b>
--	---



Sieving	
Size [mm]	% passing
75	100
63	100
50	100
37.5	100
28	100
20	100
14	99.3
10	97.7
6.3	96.4
5	95.8
3.35	94.8
2	93.8
1.18	92.3
0.6	88.1
0.425	81.6
0.3	49
0.212	23.8
0.15	18.1
0.063	10.3

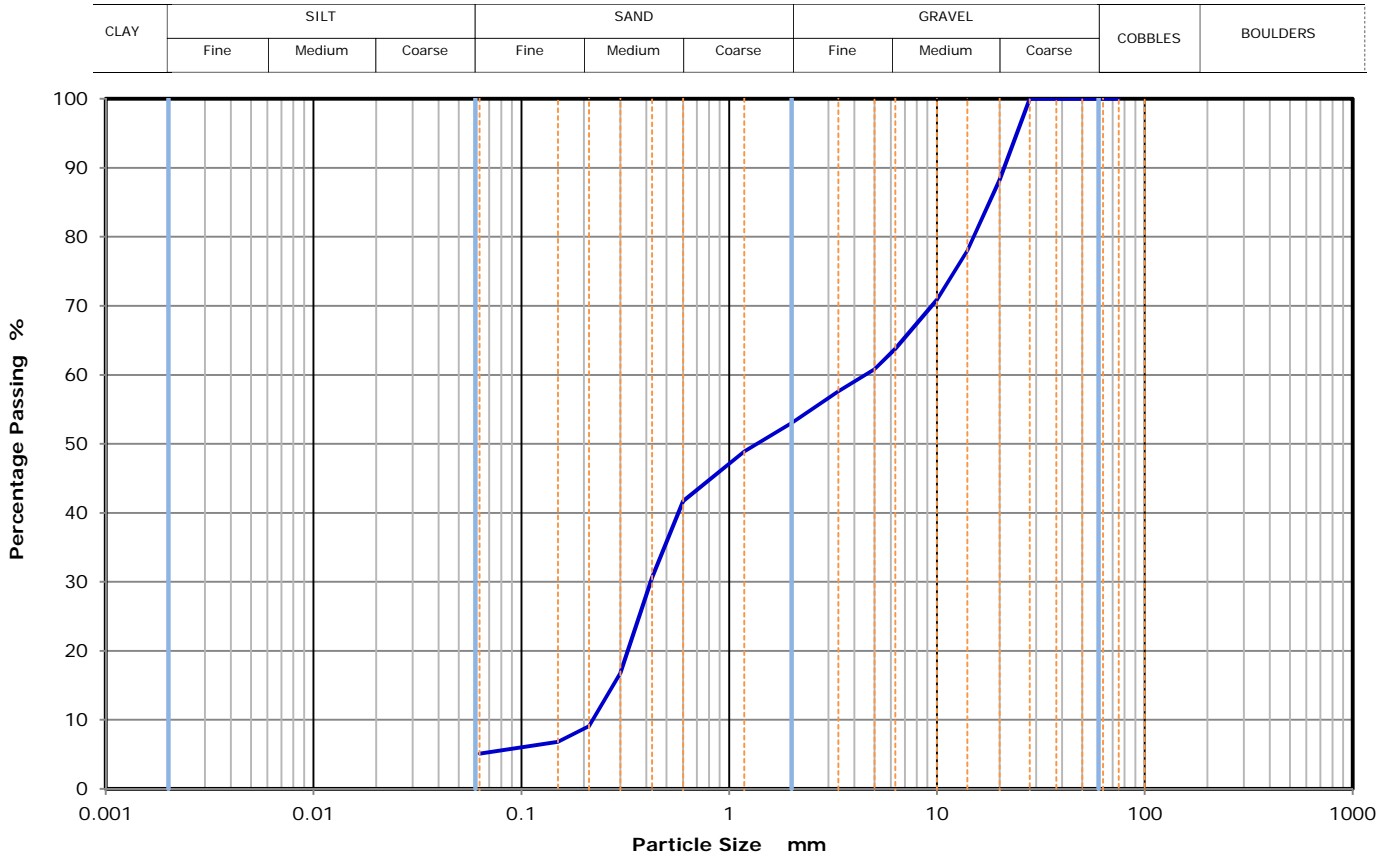
Sample proportions	%
Cobbles	0
Gravel	6
Sand	84
Fines <0.063mm	10

Grading analysis		
D60	mm	0.3
D30	mm	0.2
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Test method and date	
Testing in accordance with BS EN ISO 17892:	
Wet sieving method	
Reporting date:	08 Nov 16

### PARTICLE SIZE DISTRIBUTION

Hole ID: <b>WS10A</b>	Description: <b>Light brown silty SAND and GRAVEL</b>
Depth [m]: <b>3.00</b>	



Sieving	
Size [mm]	% passing
75	100
63	100
50	100
37.5	100
28	100
20	88.3
14	78
10	70.9
6.3	63.8
5	60.8
3.35	57.6
2	53
1.18	48.9
0.6	41.7
0.425	30.6
0.3	16.8
0.212	9.1
0.15	6.8
0.063	5.1

Sample proportions	%
Cobbles	0
Gravel	47
Sand	48
Fines <0.063mm	5

Grading analysis		
D60	mm	4.5
D30	mm	0.4
D10	mm	0.2
Uniformity Coefficient		20.5
Curvature Coefficient		0.2

Test method and date	
Testing in accordance with BS EN ISO 17892:	
Wet sieving method	
Reporting date:	08 Nov 16

**SUMMARY OF UNDRAINED SHEAR STRENGTH TEST RESULTS**

BH ID	Depth [m]	Moisture content [%]	Bulk density [Mg/m <sup>3</sup> ]	Dry density [Mg/m <sup>3</sup> ]	Cell pressure [kPa]	( $\sigma_1 - \sigma_3$ ) <sub>f</sub> [kPa]	Failure strain [%]	Failure mode	Undrained cohesion [kPa]	Remarks
BH1	1.55	10	1.98	1.80	70	94	7.00	B	47	
	6.55	27	1.91	1.50	130	142	4.00	B	71	
	9.55	26	2.00	1.59	190	427	5.00	B	214	
	12.55	26	1.97	1.56	250	295	5.00	P	148	
	15.55	20	2.05	1.71	310	429	5.00	B	215	
	18.55	26	2.00	1.58	370	445	4.00	P	223	
	21.55	25	1.98	1.58	430	576	8.00	B	288	
	24.55	25	2.01	1.61	490	421	7.00	B	211	
BH2B	5.05	28	1.95	1.52	100	151	5.00	P	76	
	8.05	26	1.97	1.56	160	187	5.00	P	94	
	11.50	25	1.99	1.59	220	386	8.00	B	193	
	14.05	27	1.95	1.54	280	377	7.00	P	189	
	17.05	26	1.96	1.55	340	349	4.00	B	175	
	20.05	25	1.96	1.57	400	423	4.00	B	212	
	23.05	23	2.04	1.66	460	706	8.00	B	353	
	26.05	25	2.03	1.62	520	459	6.00	B	230	
	29.55	25	2.07	1.66	590	825	6.00	B	413	

Testing in accordance with BS EN ISO 17892 UU = unconsolidated, undrained; MUU = multistage, unconsolidated, ur Date: 01 November 16

Unless stated otherwise: Rate of strain = 2mm/min, Standard latex membrane used with thickness = 0.5mm

Failure modes: B = brittle, I = intermediate, P = plastic

[Triaxial Sheet 1 of 1]



James Williams  
Soil Consultants Ltd  
Chiltern House  
Earl Howe Road  
Holmer Green  
High Wycombe  
Buckinghamshire  
HP15 6QT

**QTS Environmental Ltd**  
Unit 1  
Rose Lane Industrial Estate  
Rose Lane  
Lenham Heath  
Kent  
ME17 2JN  
t: 01622 850410  
[russell.jarvis@qtsenvironmental.com](mailto:russell.jarvis@qtsenvironmental.com)

## **QTS Environmental Report No: 16-50918**

**Site Reference:** Stag Brewery, Lower Richmond Road, Mortlake, London

**Project / Job Ref:** 10022/JW

**Order No:** None Supplied

**Sample Receipt Date:** 26/10/2016

**Sample Scheduled Date:** 26/10/2016

**Report Issue Number:** 1

**Reporting Date:** 01/11/2016

**Authorised by:**

Russell Jarvis  
Associate Director of Client Services

**Authorised by:**

Ela Mysiara  
Inorganics & ICP Section Head



<b>Soil Analysis Certificate</b>						
<b>QTS Environmental Report No: 16-50918</b>	<b>Date Sampled</b>	15/10/16	15/10/16	15/10/16	15/10/16	15/10/16
<b>Soil Consultants Ltd</b>	<b>Time Sampled</b>	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
<b>Site Reference: Stag Brewery, Lower Richmond Road, Mortlake, London</b>	<b>TP / BH No</b>	WS2	WS4	WS9A	WS10A	BH1
<b>Project / Job Ref: 10022/JW</b>	<b>Additional Refs</b>	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
<b>Order No: None Supplied</b>	<b>Depth (m)</b>	2.00	4.70	3.90	4.50	1.55
<b>Reporting Date: 01/11/2016</b>	<b>QTSE Sample No</b>	235212	235213	235214	235215	235216

<b>Determinand</b>	<b>Unit</b>	<b>RL</b>	<b>Accreditation</b>					
pH	pH Units	N/a	<b>MCERTS</b>	8.6	7.4	7.7	8.3	8.2
Total Sulphate as SO <sub>4</sub>	mg/kg	< 200	NONE	< 200	< 200	1002	856	206
Total Sulphate as SO <sub>4</sub>	%	< 0.02	NONE	< 0.02	< 0.02	0.10	0.09	0.02
W/S Sulphate as SO <sub>4</sub> (2:1)	mg/l	< 10	<b>MCERTS</b>	23	< 10	166	161	26
W/S Sulphate as SO <sub>4</sub> (2:1)	g/l	< 0.01	<b>MCERTS</b>	0.02	< 0.01	0.17	0.16	0.03
Total Sulphur	%	< 0.02	NONE	< 0.02	< 0.02	1.19	0.42	0.02

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C  
 Analysis carried out on the dried sample is corrected for the stone content

Subcontracted analysis <sup>(5)</sup>



**QTS Environmental Ltd**  
**Unit 1, Rose Lane Industrial Estate**  
**Rose Lane**  
**Lenham Heath**  
**Maidstone**  
**Kent ME17 2JN**  
**Tel : 01622 850410**



<b>Soil Analysis Certificate</b>						
<b>QTS Environmental Report No: 16-50918</b>	<b>Date Sampled</b>	15/10/16	15/10/16	15/10/16	15/10/16	15/10/16
<b>Soil Consultants Ltd</b>	<b>Time Sampled</b>	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
<b>Site Reference: Stag Brewery, Lower Richmond Road, Mortlake, London</b>	<b>TP / BH No</b>	BH1	BH1	BH2B	BH2B	BH2B
<b>Project / Job Ref: 10022/JW</b>	<b>Additional Refs</b>	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
<b>Order No: None Supplied</b>	<b>Depth (m)</b>	6.55	12.55	17.05	23.05	29.55
<b>Reporting Date: 01/11/2016</b>	<b>QTSE Sample No</b>	235217	235218	235219	235220	235221

<b>Determinand</b>	<b>Unit</b>	<b>RL</b>	<b>Accreditation</b>					
pH	pH Units	N/a	<b>MCERTS</b>	8.1	8.8	9.1	8.9	9.3
Total Sulphate as SO <sub>4</sub>	mg/kg	< 200	NONE	971	1737	952	685	670
Total Sulphate as SO <sub>4</sub>	%	< 0.02	NONE	0.10	0.17	0.10	0.07	0.07
W/S Sulphate as SO <sub>4</sub> (2:1)	mg/l	< 10	<b>MCERTS</b>	197	251	178	105	90
W/S Sulphate as SO <sub>4</sub> (2:1)	g/l	< 0.01	<b>MCERTS</b>	0.20	0.25	0.18	0.11	0.09
Total Sulphur	%	< 0.02	NONE	0.57	2.56	0.63	0.72	0.61

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Analysis carried out on the dried sample is corrected for the stone content

Subcontracted analysis <sup>(5)</sup>

Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 16-50918	
Soil Consultants Ltd	
Site Reference: Stag Brewery, Lower Richmond Road, Mortlake, London	
Project / Job Ref: 10022/JW	
Order No: None Supplied	
Reporting Date: 01/11/2016	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
\$ 235212	WS2	None Supplied	2.00	7.1	Light brown sand
\$ 235213	WS4	None Supplied	4.70	12.4	Light brown sand
\$ 235214	WS9A	None Supplied	3.90	21.9	Brown clay
\$ 235215	WS10A	None Supplied	4.50	21.7	Brown clay
\$ 235216	BH1	None Supplied	1.55	8.5	Light brown sandy clay with stones
\$ 235217	BH1	None Supplied	6.55	19.1	Brown clay
\$ 235218	BH1	None Supplied	12.55	16.1	Light grey clay
\$ 235219	BH2B	None Supplied	17.05	17	Brown clay
\$ 235220	BH2B	None Supplied	23.05	16.7	Brown clay
\$ 235221	BH2B	None Supplied	29.55	16.9	Brown clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample <sup>1/5</sup>

Unsuitable Sample <sup>1/5</sup>

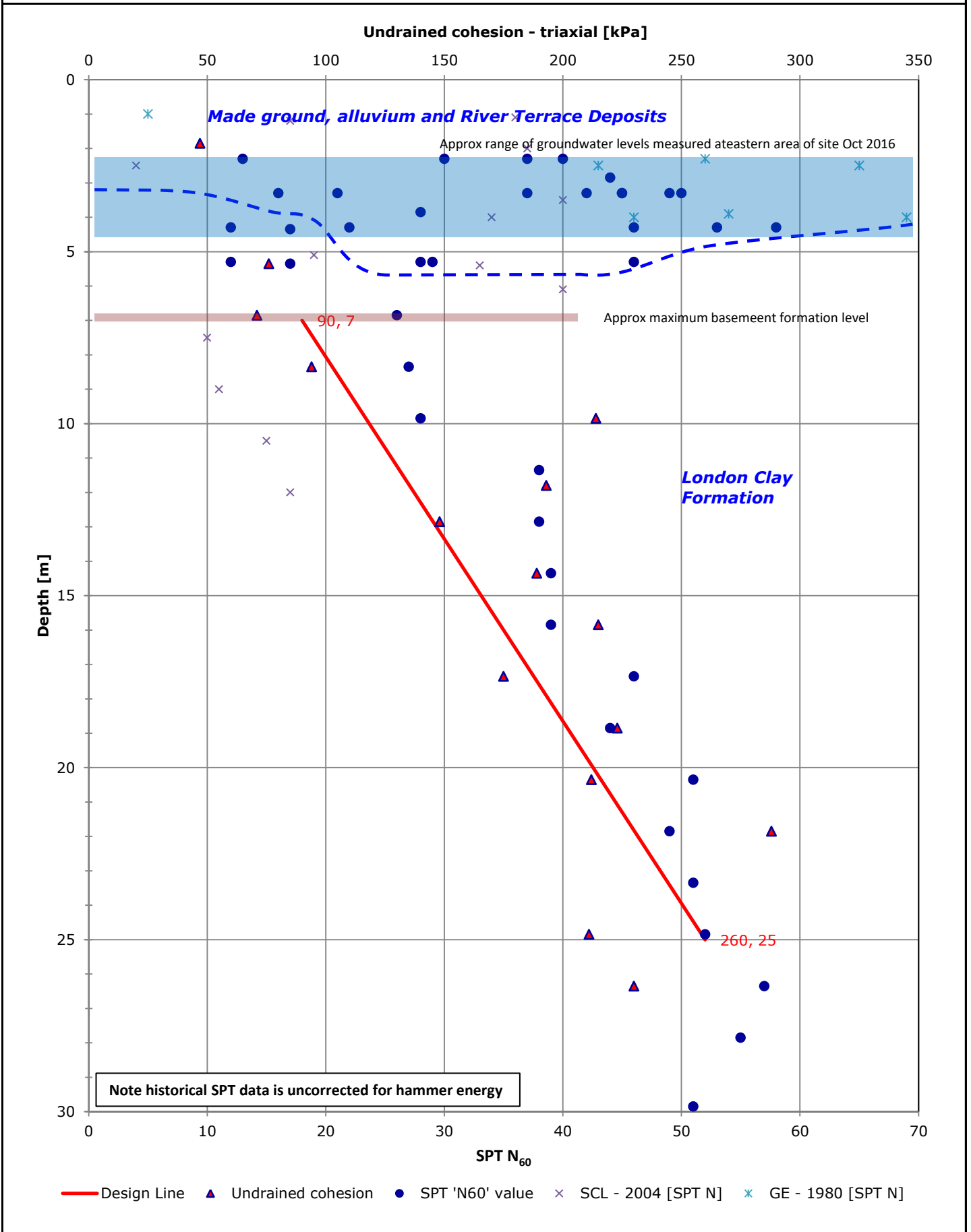
\$ samples exceeded recommended holding times

<b>Soil Analysis Certificate - Methodology &amp; Miscellaneous Information</b>	
<b>QTS Environmental Report No: 16-50918</b>	
<b>Soil Consultants Ltd</b>	
<b>Site Reference: Stag Brewery, Lower Richmond Road, Mortlake, London</b>	
<b>Project / Job Ref: 10022/JW</b>	
<b>Order No: None Supplied</b>	
<b>Reporting Date: 01/11/2016</b>	

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCS	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

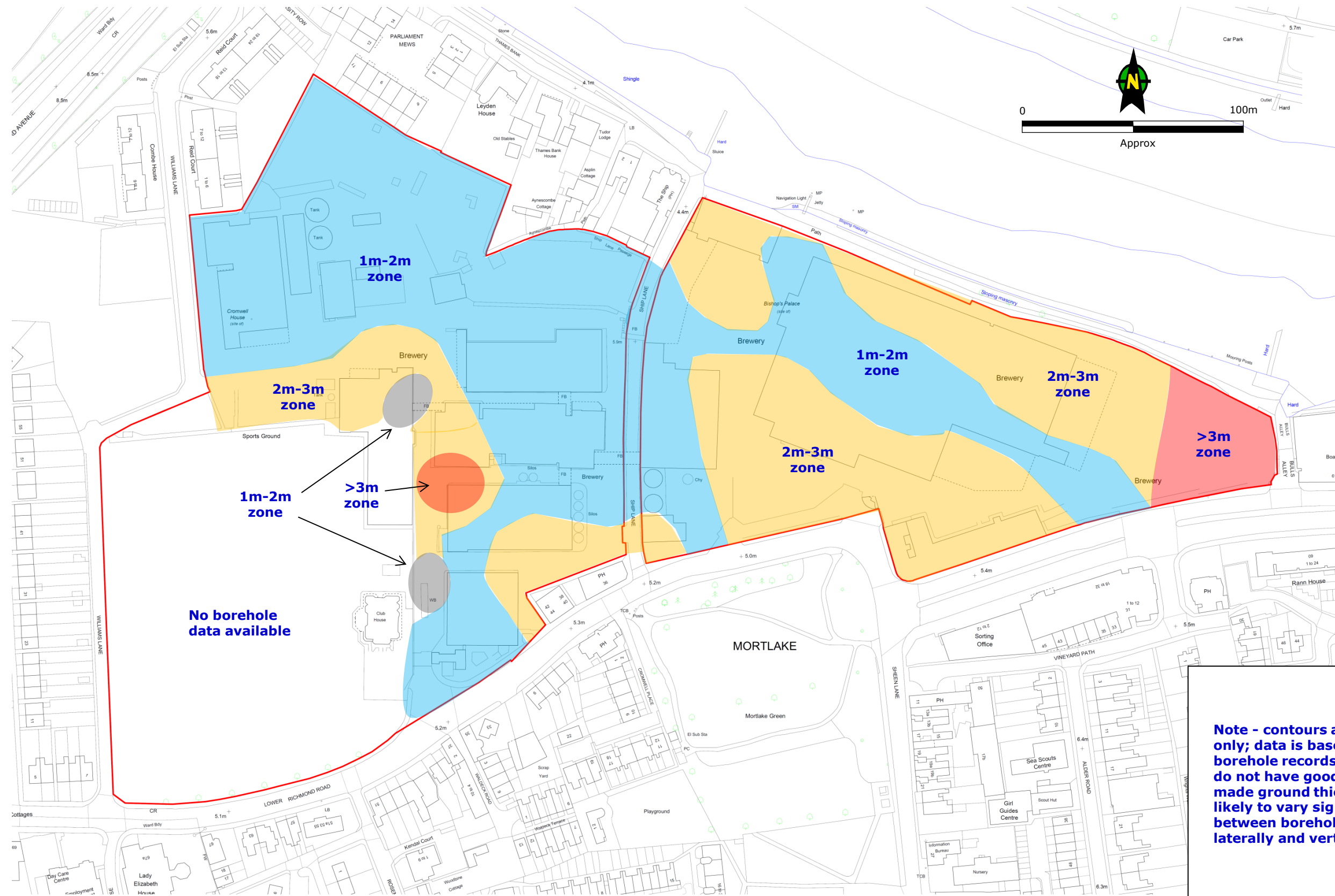
**D Dried**  
**AR As Received**

**Undrained cohesion and SPT [N60] vs depth**



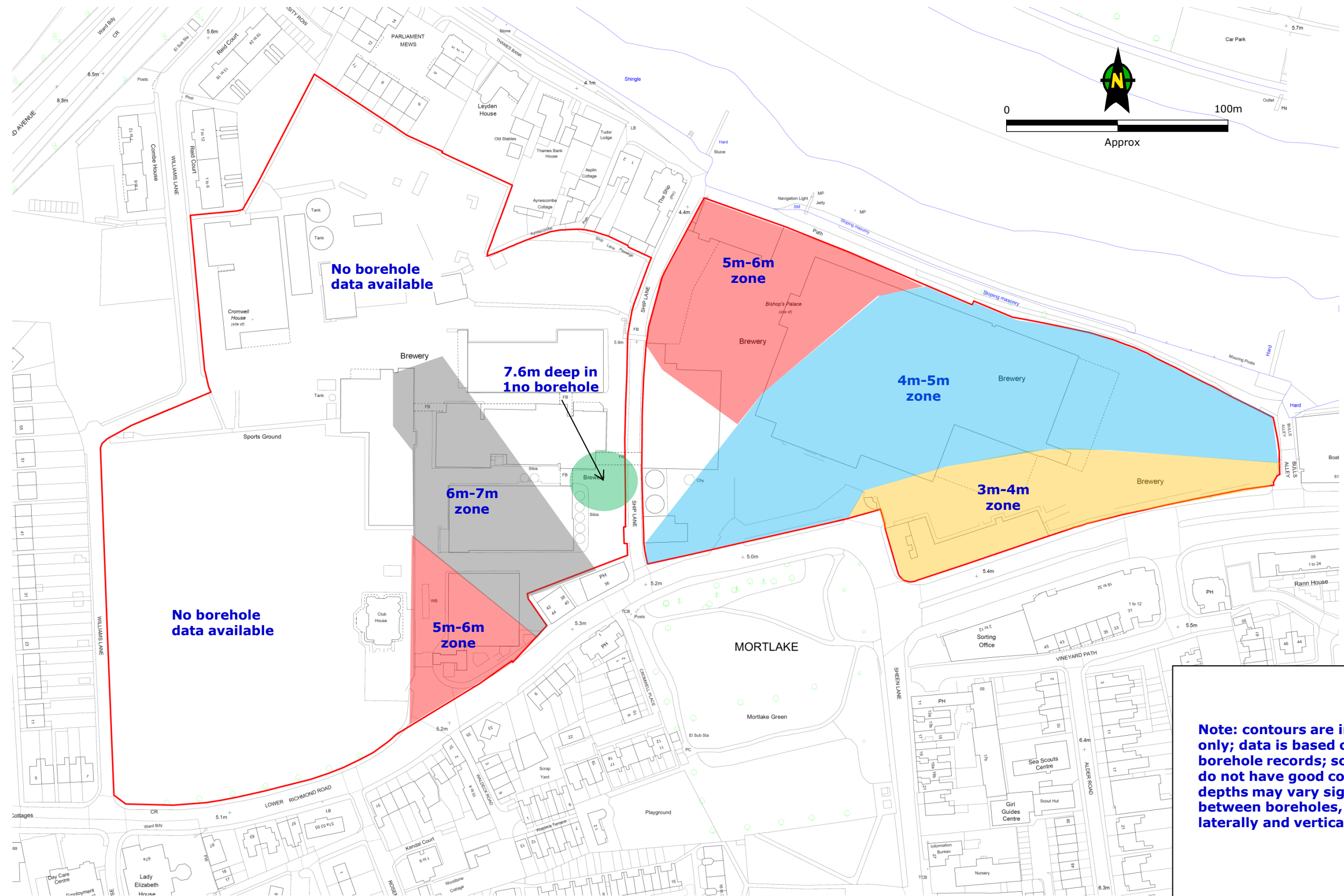
Note: this plot may incorporate extrapolated results, generally where 'N' > 50 - these are indicative only and should be used with caution

Depth to top - River Terrace Deposits



**Note - contours are indicative only; data is based on available borehole records; some areas do not have good thickness coverage and made ground thicknesses are likely to vary significantly between boreholes, both laterally and vertically**

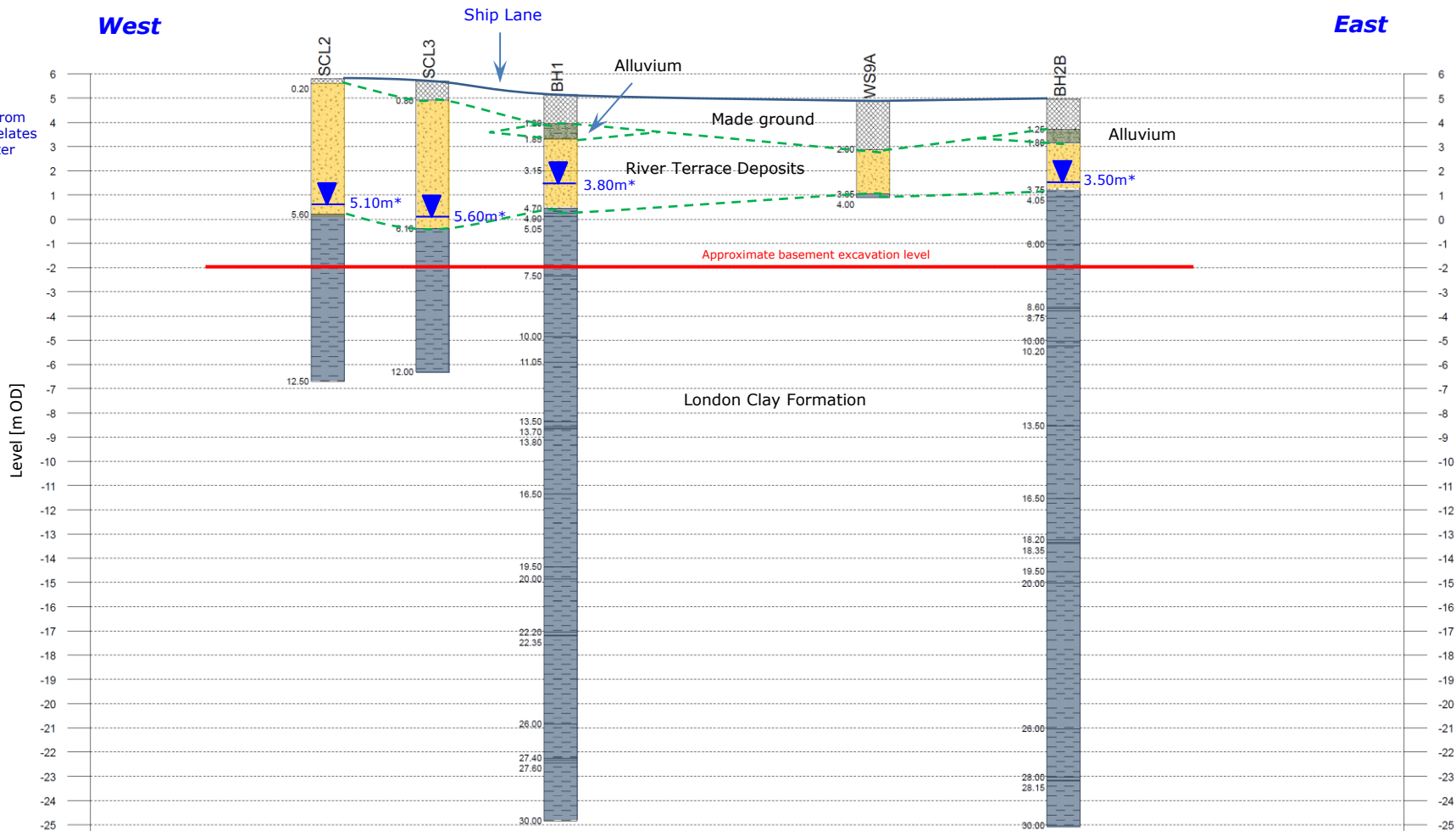
Depth to top – London Clay Formation



# Section AA

Notes:

\* Groundwater levels shown are highest recorded at time of writing; information from historical boreholes relates to information on water strikes during drilling



Chainage (m)	0.00	38.42	83.28	138.27	272.35	353.96	436.57
Offset (m)		1.91	6.04	2.48	3.71	4.81	
Elevation (mAOD)		5.80	5.70	5.15	4.89	4.96	

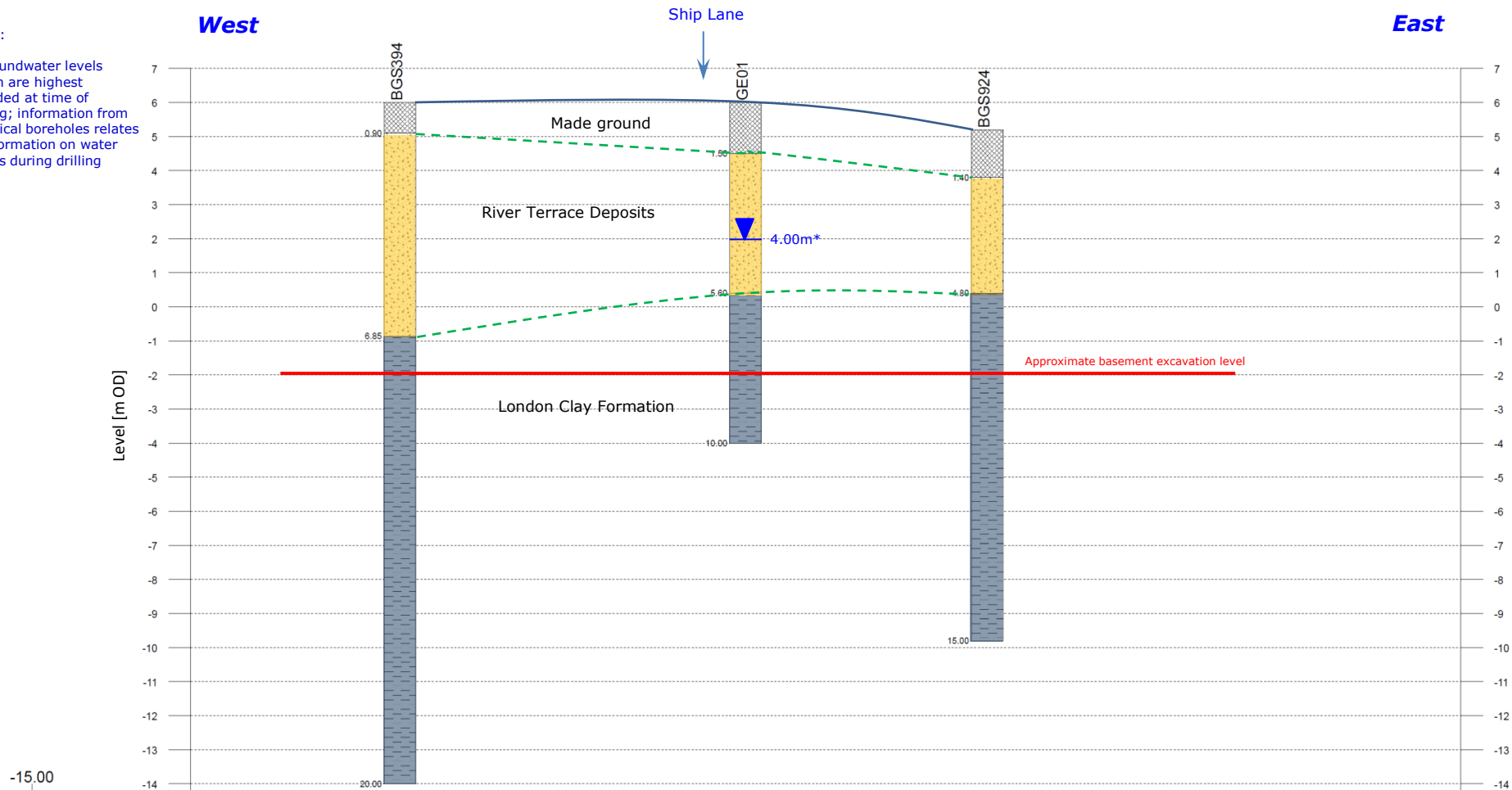
STRATA BOUNDARIES BETWEEN BOREHOLES INDICATIVE ONLY; VARIATIONS BETWEEN BOREHOLES SHOULD BE ANTICIPATED



# Section BB

Notes:

\* Groundwater levels shown are highest recorded at time of writing; information from historical boreholes relates to information on water strikes during drilling



Chainage (m)	0.00	23.46	145.63	161.05	231.07	347.94
Offset (m)		3.63	12.41	4.39	10.13	
Elevation (mAOD)		6.00	6.00	6.08	5.20	



**ABBREVIATIONS**

1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22
23	23	23	23
24	24	24	24
25	25	25	25
26	26	26	26
27	27	27	27
28	28	28	28
29	29	29	29
30	30	30	30
31	31	31	31
32	32	32	32
33	33	33	33
34	34	34	34
35	35	35	35
36	36	36	36
37	37	37	37
38	38	38	38
39	39	39	39
40	40	40	40
41	41	41	41
42	42	42	42
43	43	43	43
44	44	44	44
45	45	45	45
46	46	46	46
47	47	47	47
48	48	48	48
49	49	49	49
50	50	50	50

**LEVEL NOTE.**  
 ALL CO-ORDINATES RELATE TO THE ORDNANCE SURVEY GRID AND DATUM VIA GPS OBSERVATIONS.

**COMPARISON SCHEDULE**

Station	Old	New	Difference
1	4.80	4.80	0.00
2	4.50	4.50	0.00
3	4.20	4.20	0.00
4	4.10	4.10	0.00
5	4.00	4.00	0.00
6	3.90	3.90	0.00
7	3.80	3.80	0.00
8	3.70	3.70	0.00
9	3.60	3.60	0.00
10	3.50	3.50	0.00
11	3.40	3.40	0.00
12	3.30	3.30	0.00
13	3.20	3.20	0.00
14	3.10	3.10	0.00
15	3.00	3.00	0.00
16	2.90	2.90	0.00
17	2.80	2.80	0.00
18	2.70	2.70	0.00
19	2.60	2.60	0.00
20	2.50	2.50	0.00
21	2.40	2.40	0.00
22	2.30	2.30	0.00
23	2.20	2.20	0.00
24	2.10	2.10	0.00
25	2.00	2.00	0.00
26	1.90	1.90	0.00
27	1.80	1.80	0.00
28	1.70	1.70	0.00
29	1.60	1.60	0.00
30	1.50	1.50	0.00
31	1.40	1.40	0.00
32	1.30	1.30	0.00
33	1.20	1.20	0.00
34	1.10	1.10	0.00
35	1.00	1.00	0.00
36	0.90	0.90	0.00
37	0.80	0.80	0.00
38	0.70	0.70	0.00
39	0.60	0.60	0.00
40	0.50	0.50	0.00
41	0.40	0.40	0.00
42	0.30	0.30	0.00
43	0.20	0.20	0.00
44	0.10	0.10	0.00
45	0.00	0.00	0.00

↑

All underground services information shown on this plan is based on general knowledge and should not be taken as a guarantee of accuracy. The client is responsible for the accuracy and completeness of the data and for the results of the survey. The client is also responsible for the accuracy and completeness of the data and for the results of the survey. This is not a professional statement and should not be used as such. It is the client's responsibility to ensure that all relevant legislation and standards are followed. The client is responsible for the accuracy and completeness of the data and for the results of the survey. This is not a professional statement and should not be used as such. It is the client's responsibility to ensure that all relevant legislation and standards are followed.



Revisions	Date

Date JULY 2015 Drawn LJC  
 Scale A0@ 1:200 Checked CPM

Dwg. No. 915213-7 Job No. 915213  
 Client  
 GERALD EVE  
 LLP

Dwg. Title  
 LAND SURVEY  
 Project Title  
 STAG BREWERY,  
 MORTLAKE

Block B, 1st Floor  
 Queens Road  
 Barnet  
 London EN5 4DL  
 t:020 8449 9143  
 www.aprservices.net  
 Apr Offices: Epsom, Salisbury, Moulton





Client	GERALD EVE LLP	Date	JULY 2015	Drawn	LJC
Dwg. Title	LAND SURVEY	Scale	A0@ 1:200	Checked	CPM
Project Title	STAG BREWERY, MORTLAKE	Dwg. No.	915213-4	Job No.	915213
		Revisions		Date	

LEVEL NOTE  
ALL COORDINATES RELATE TO THE ORDNANCE SURVEY  
GRID AND DATUM VIA GPS OBSERVATIONS.

**ABBREVIATIONS**

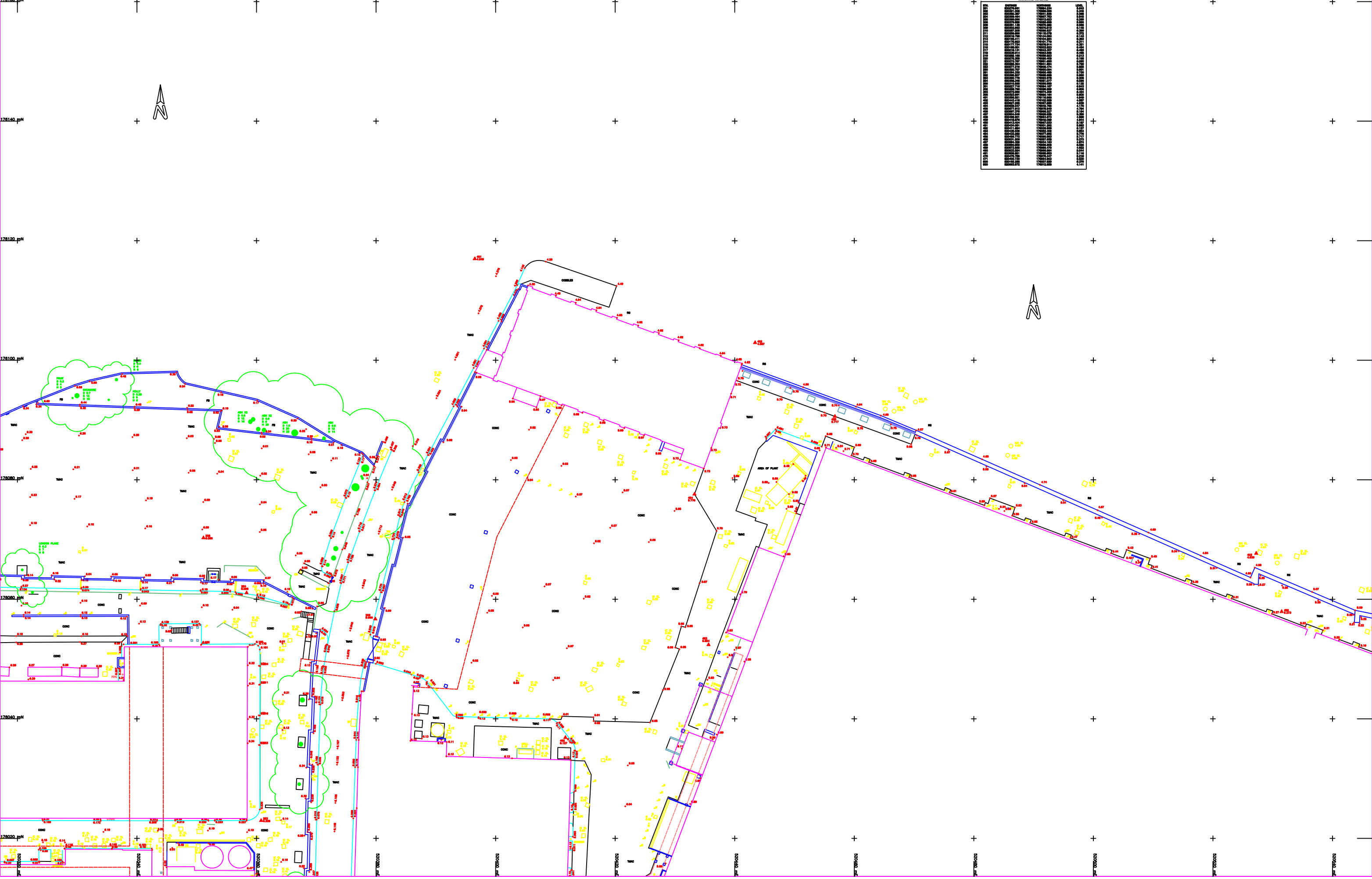
APR	APR SERVICES
CPM	CHIEF PROJECT MANAGER
LJC	LEAD JOURNALIST
...	...



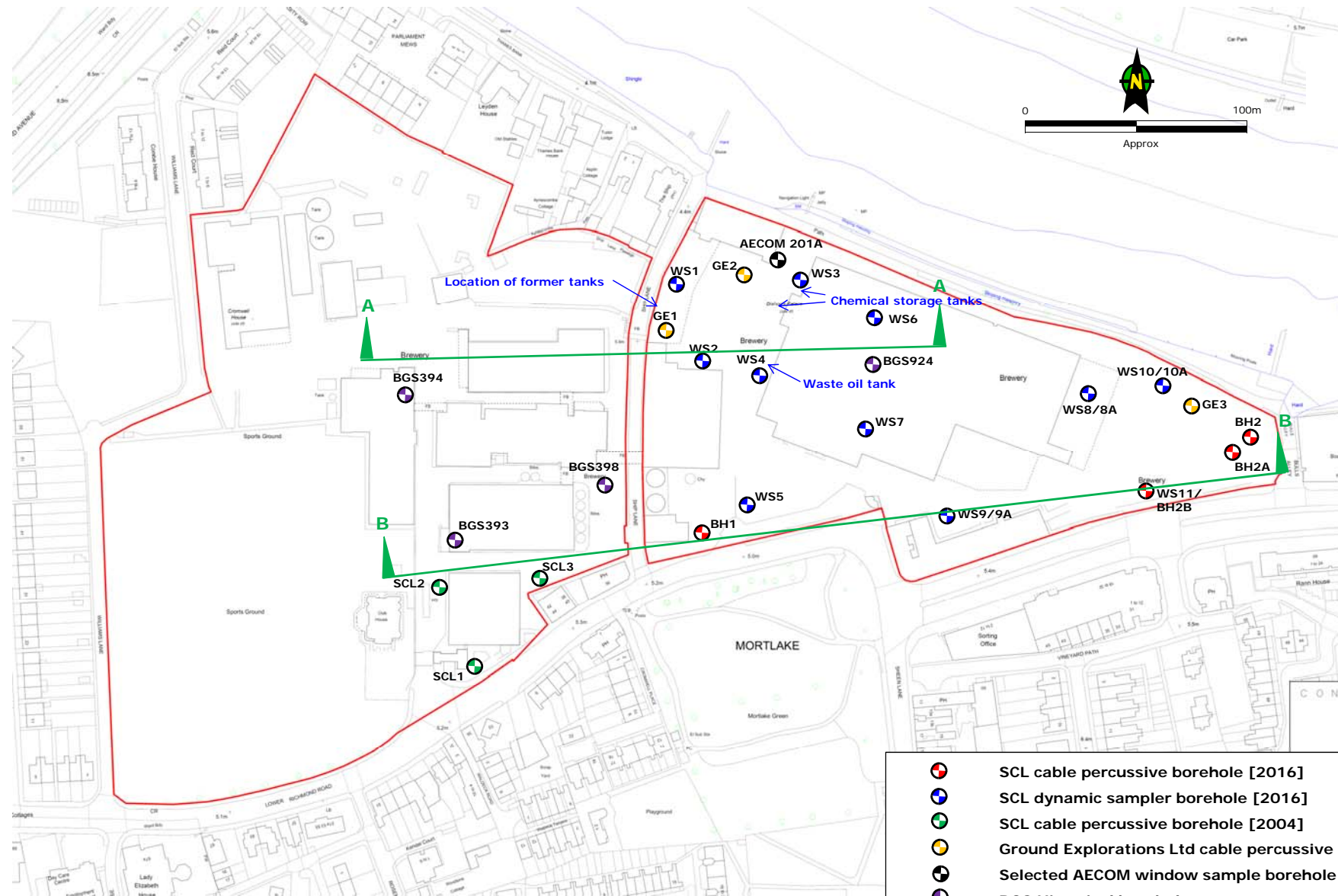
Block 8, 1st Floor  
Queens Road  
Barnet  
London EN6 4DL  
1520 8449 9143  
1520 8449 9153  
www.aprservices.net  
AIA, IEMA &  
SABRE and Plymouth







**CONTINUED SURVEILANCE**

NO.	DESCRIPTION	DATE	STATUS
1	...	...	...
2	...	...	...
3	...	...	...
4	...	...	...
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37	...	...	...
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39	...	...	...
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41	...	...	...
42	...	...	...
43	...	...	...
44	...	...	...
45	...	...	...
46	...	...	...
47	...	...	...
48	...	...	...
49	...	...	...
50	...	...	...



Exploratory Hole Location Plan



-  SCL cable percussive borehole [2016]
-  SCL dynamic sampler borehole [2016]
-  SCL cable percussive borehole [2004]
-  Ground Explorations Ltd cable percussive borehole [1980]
-  Selected AECOM window sample borehole [2015]
-  BGS Historical borehole

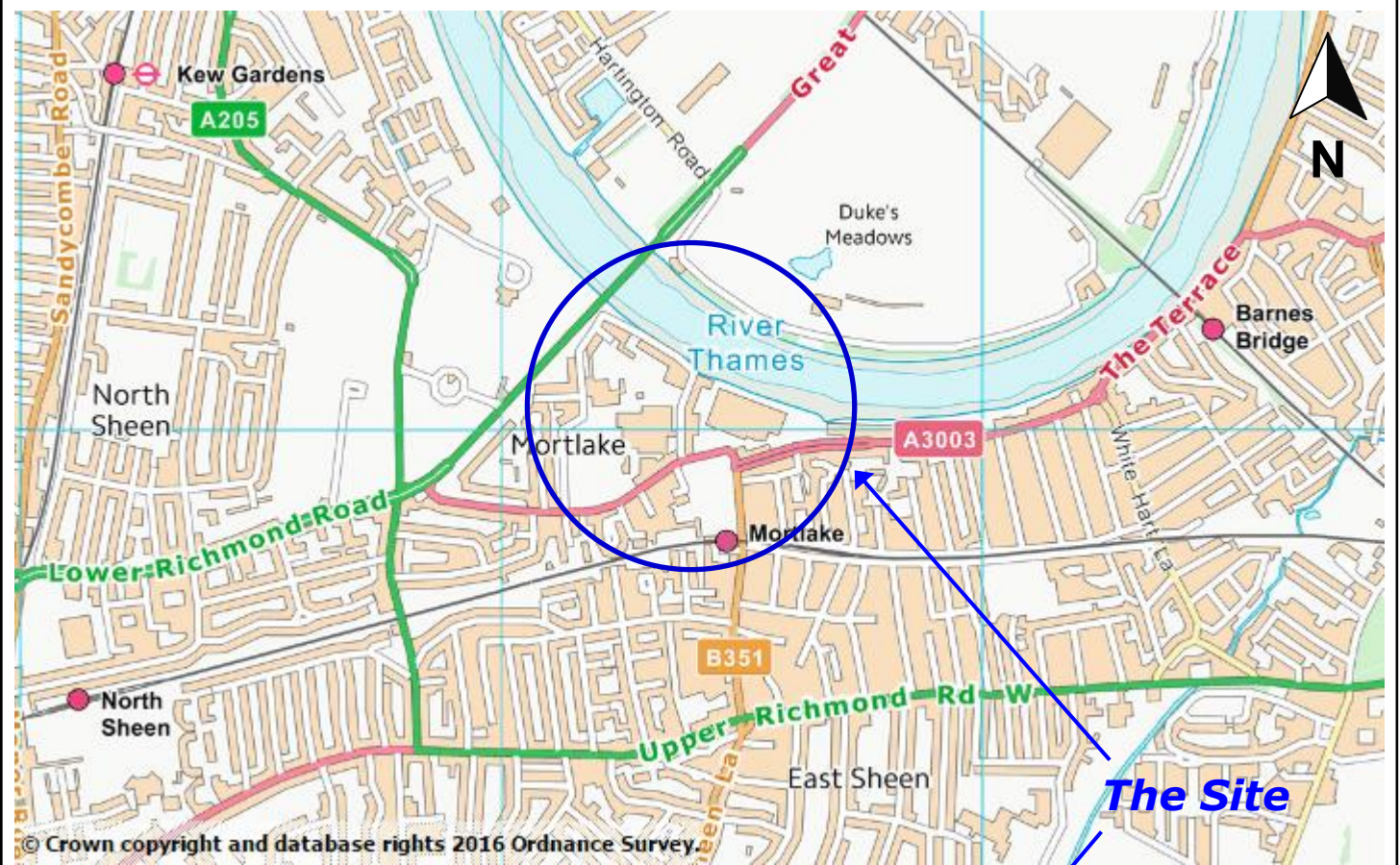
**Head Office:**  
 Chiltern House, Earl Howe Road, Holmer Green  
 High Wycombe, Bucks HP15 6QT  
 t: 01494 712494  
 e: mail@soilconsultants.co.uk

**Cardiff office:**  
 23 Romilly Road  
 Cardiff CF5 1FH  
 t: 02920 403575  
 E: cardiff@soilconsultants.co.uk

**Harwich Office:**  
 Haven House, Albemarle Street  
 Harwich, Essex CO12 3HL  
 t: 01255 241639  
 e: harwich@soilconsultants.co.uk



**Site Location Plan**



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Approx NGR of site 520410E, 176030N

## Appendix D Groundwater Monitoring Results

- **Equipment List**
- **Groundwater Monitoring Results (1 page)**
- **Low-flow Monitoring Results (3 pages)**

Table D.1: Groundwater monitoring equipment list

Equipment	Description	Range/Accuracy
Waterra SmarTROLL	Conductivity, pH/Temperature and Dissolved Oxygen Meter	0.0 to 199.9 $\mu$ S/cm, 0 to 1999 $\mu$ S/cm, 0.00 to 19.99 mS/cm, 0.0 to 199.9mS/cm $\pm$ 1% of Full Scale (exc. probe error) pH: 0.00 to 14.00 pH $\pm$ 0.01 pH Temperature: 0.0 to 60.0°C $\pm$ 0.5°C 0.0 to 19.9 mg/l $\pm$ 1.5% of Full Scale
Dip meter	Dip meter	$\pm$ 1mm





<b>Project Name</b>	Stag Brewery
<b>Project Reference</b>	WIE10667-100
<b>Consultant</b>	Robbie Moore
<b>Date</b>	27/10/2016
<b>Time</b>	12:00

<b>Weather Conditions</b>	Warm	x	Sunny		Overcast		Rain	
<b>Wind Conditions</b>	Still		Slight Breeze	x	Strong breeze			
<b>Ground Conditions</b>	Dry	x	Damp		Wet		Flooded	
<b>Site Conditions</b>								

### Groundwater monitoring

Location	Ground level	Dip	Dip	Base	Water column	Well diameter	Purge volume	Dip after purging and sampling
	m	m bgl	m AOD	m bgl	m	m	l	m bgl
BH1	5.58	3.82	1.76	5.87	2.05	0.05	12.08	3.82
BH2B	5.16	3.51	1.65	4.9	1.39	0.05	8.19	3.5
WS1	6.05	4.48	1.57	4.7	0.22	0.05	1.30	Recharge too slow
WS2	6.12	Dry	Dry	2.07	N/A	N/A	N/A	N/A
WS4	5.58	4.1	1.48	4.49	0.39	0.05	2.30	Recharge too slow
WS5	5.89	3.09	2.8	3.18	0.09	0.05	0.53	Recharge too slow
WS7	5.65	4.42	1.23	4.52	0.1	0.05	0.59	Recharge too slow
WS8	4.85	Dry	Dry	2.42	N/A	N/A	N/A	N/A
WS9	4.96	Dry	Dry	0.85	N/A	N/A	N/A	N/A
WS10	4.9	2.3	2.6	3.9	1.6	0.05	9.42	2.72

Product Name: Low-Flow System

Date: 2016-10-27 12:16:39

Project Information:

Operator Name RJM  
Company Name Waterman  
Project Name Stag Brewery  
Site Name WIE10667 Stag Brewery  
Latitude 0° 0' 0"  
Longitude 0° 0' 0"  
Sonde SN 439903  
Turbidity Make/Model

Pump Information:

Pump Model/Type  
Tubing Type  
Tubing Diameter cm  
Tubing Length m  
Pump placement from TOC m

Well Information:

Well ID 50  
Well diameter .5 cm  
Well Total Depth 5.87 m  
Screen Length 2 m  
Depth to Water 3.82 m

Pumping Information:

Final Pumping Rate 0 mL/min  
Total System Volume 0.09 L  
Calculated Sample Rate 180 sec  
Stabilization Drawdown 0 cm  
Total Volume Pumped 0 L

Low-Flow Sampling Stabilization Summary

	Time	Elapsed	Temp C +/- 0.2%	pH +/- 0.2%	SpCond $\mu$ S/cm +/- 3%	Turb NTU +/- 10%	DTW m	RDO mg/L +/- 10%	ORP mV +/- 20%
Stabilization									
Last 5	12:10:30	180.09	16.41	6.80	247027.09	--	--	0.51	11.62
Last 5	12:13:30	360.02	16.49	6.82	247535.89	--	--	0.24	13.61
Last 5	12:16:30	540.02	16.48	6.83	248046.56	--	--	0.23	17.06
Last 5									
Variance 0			nan	nan	nan			nan	nan
Variance 1			0.07	0.02	508.80			-0.26	1.98
Variance 2			-0.01	0.01	510.67			-0.02	3.45

Notes

Grab Samples

Product Name: Low-Flow System

Date: 2016-10-27 13:01:49

Project Information:

Operator Name RJM  
Company Name Waterman  
Project Name Stag Brewery  
Site Name WIE10667 Stag Brewery  
Latitude 0° 0' 0"  
Longitude 0° 0' 0"  
Sonde SN 439903  
Turbidity Make/Model

Pump Information:

Pump Model/Type  
Tubing Type  
Tubing Diameter cm  
Tubing Length m  
Pump placement from TOC m

Well Information:

Well ID bh2b  
Well diameter .5 cm  
Well Total Depth 5.87 m  
Screen Length 2 m  
Depth to Water 3.82 m

Pumping Information:

Final Pumping Rate 0 mL/min  
Total System Volume 0.09 L  
Calculated Sample Rate 180 sec  
Stabilization Drawdown 0 cm  
Total Volume Pumped 0 L

Low-Flow Sampling Stabilization Summary

	Time	Elapsed	Temp C +/- 0.2%	pH +/- 0.2%	SpCond $\mu$ S/cm +/- 3%	Turb NTU +/- 10%	DTW m	RDO mg/L +/- 10%	ORP mV +/- 20%
Stabilization									
Last 5	12:55:16	180.03	17.00	7.30	123583.90	--	--	2.19	161.42
Last 5	12:58:16	360.02	17.09	7.28	117193.95	--	--	2.49	174.05
Last 5	13:01:16	540.02	17.08	7.28	116731.30	--	--	2.42	180.65
Last 5									
Variance 0			nan	nan	nan			nan	nan
Variance 1			0.09	-0.01	-6389.95			0.30	12.63
Variance 2			-0.01	-0.00	-462.65			-0.06	6.60

Notes

Grab Samples

Product Name: Low-Flow System

Date: 2016-10-27 13:46:07

Project Information:

Operator Name RJM  
Company Name Waterman  
Project Name Stag Brewery  
Site Name WIE10667 Stag Brewery  
Latitude 0° 0' 0"  
Longitude 0° 0' 0"  
Sonde SN 439903  
Turbidity Make/Model

Pump Information:

Pump Model/Type  
Tubing Type  
Tubing Diameter cm  
Tubing Length m  
Pump placement from TOC m

Well Information:

Well ID ws10  
Well diameter .5 cm  
Well Total Depth 5.87 m  
Screen Length 2 m  
Depth to Water 3.82 m

Pumping Information:

Final Pumping Rate 0 mL/min  
Total System Volume 0.09 L  
Calculated Sample Rate 180 sec  
Stabilization Drawdown 0 cm  
Total Volume Pumped 0 L

Low-Flow Sampling Stabilization Summary

	Time	Elapsed	Temp C +/- 0.2%	pH +/- 0.2%	SpCond $\mu$ S/cm +/- 3%	Turb NTU +/- 10%	DTW m	RDO mg/L +/- 10%	ORP mV +/- 20%
Stabilization									
Last 5	13:40:00	180.02	17.01	12.03	311227.97	--	--	0.56	131.57
Last 5	13:43:00	360.02	17.04	12.04	310598.81	--	--	0.57	139.19
Last 5	13:46:00	540.02	17.04	12.05	310186.38	--	--	0.57	143.56
Last 5									
Variance 0			nan	nan	nan			nan	nan
Variance 1			0.03	0.01	-629.16			0.00	7.61
Variance 2			-0.00	0.01	-412.44			0.00	4.38

Notes

Grab Samples

## Appendix E      Groundwater, Ground Gas and Vapour Level Monitoring Results

- **Equipment List**
- **Soil Consultants vapour monitoring results during ground investigation**
- **Waterman follow-up on-Site Monitoring Results**

Table E.1:      Ground gas and vapour monitoring equipment list

<b>Equipment</b>	<b>Description</b>	<b>Range/Accuracy</b>
Gas Analyser	GFM 430 infrared gas analyser	0 -100 % / $\pm 0.1$ % 0.1-2000ppm $\pm 10\%$ or $\pm 2$ ppm, whichever is greater
Photo Ionisation Detector	Ribble Enviro Photo Ionisation Detector	0.1-2000ppm $\pm 10\%$ or $\pm 2$ ppm, whichever is greater

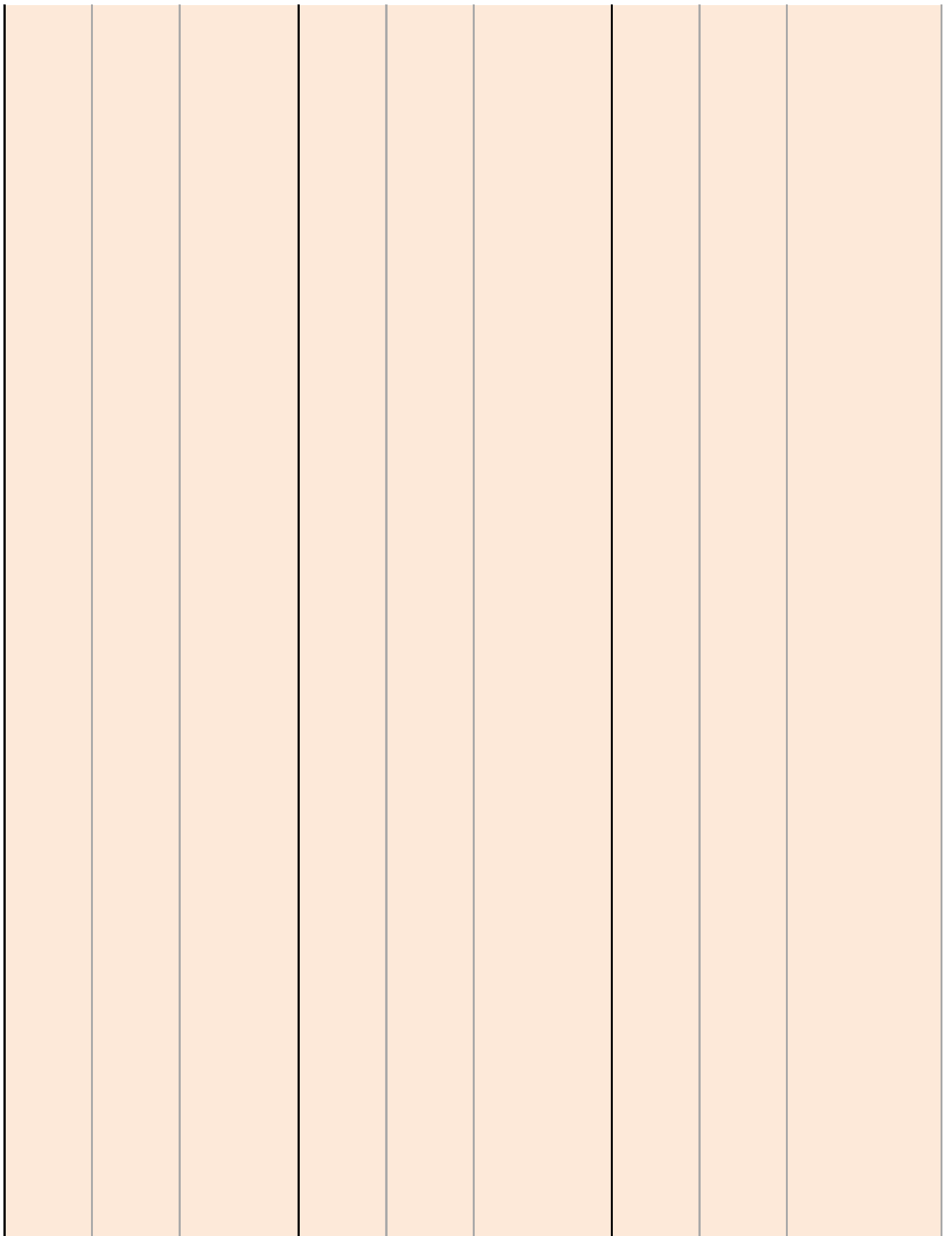
# Soil Consultants Ltd - HV, PP and PID data entry sheet

Project: Stag Brewery

Job No: 9443/JRCB

Hand vane results			Hand penetrometer results			PID results		
Hole ID	Depth	Result [kPa]	Hole ID	Depth	Result [kg/cm <sup>2</sup> ]	Hole ID	Depth	Result [ppmv]
WS9A	3.80	70				WS1	0.50	0.3
WS9A	3.90	60				WS1	1.00	0.3
WS10A	3.80	75				WS1	1.50	0.3
WS10A	3.90	70				WS1	2.50	0.3
WS10A	4.50	75				WS1	3.50	0.3
WS10A	4.70	88				WS1	4.50	0.2
WS10A	4.90	94				WS2	0.50	0.4
						WS2	1.00	0.4
						WS2	1.50	0.3
						WS2	2.50	0.2
						WS2	3.50	0.3
						WS2	4.50	1.5
						WS2	5.00	0.8
						WS3	0.50	0.4
						WS3	1.50	0.3
						WS3	2.50	1.8
						WS3	3.50	8.8
						WS3	4.50	1.3
						WS4	0.50	0.8
						WS4	1.00	0.3
						WS4	1.50	0.3
						WS4	2.00	0.5
						WS4	2.60	1.3
						WS4	3.50	4.2
						WS4	4.50	3.4
						WS5	0.50	2
						WS5	1.00	0.4
						WS5	1.50	0.5
						WS5	2.00	0.5
						WS5	2.50	0.8
						WS5	3.50	1.1
						WS5	4.50	16.3
						WS7	0.70	0.1
						WS8	1.00	0.7
						WS11	0.50	0.3
						WS7A	1.00	0.3
						WS8A	1.50	0.4
						WS8A	2.00	0.2
						WS8A	2.50	0.3
						WS9A	2.00	0.4
						WS9A	3.00	2.9
						WS10	0.50	1.1

		Hand penetrometer results			PID results		
Depth		Hole ID	Depth	Result [kg/cm <sup>2</sup> ]	Hole ID	Depth	Result [ppmv]
					WS10	1.00	0.5
					WS10	1.50	0.5
					WS10A	2.50	0.3
					WS10A	3.50	3.5
					BH1	0.50	0.5
					BH1	1.00	0.7
					BH1	1.50	0.1
					BH1	2.50	0.3
					BH1	3.50	0.3
					BH1	4.50	0.4
					BH1	5.50	0.4
					BH2	0.50	0.7
					BH2	1.00	0.9
					BH2	1.50	0.8
					BH2	2.00	0.6
					BH2	2.50	1
					BH2	3.00	5.5
					BH2B	1.50	0.1
					BH2B	2.00	0.1
					BH2B	3.00	0.1









<b>Project Name</b>	Stag Brewery
<b>Project Reference</b>	WIE10667-100
<b>Consultant</b>	Robbie Moore
<b>Date</b>	27/10/2016
<b>Time</b>	10:00

<b>Weather Conditions</b>	Warm	<input checked="" type="checkbox"/>	Sunny	<input type="checkbox"/>	Overcast	<input type="checkbox"/>	Rain	<input type="checkbox"/>
<b>Wind Conditions</b>	Still	<input type="checkbox"/>	Slight Breeze	<input checked="" type="checkbox"/>	Strong breeze	<input type="checkbox"/>		<input type="checkbox"/>
<b>Ground Conditions</b>	Dry	<input checked="" type="checkbox"/>	Damp	<input type="checkbox"/>	Wet	<input type="checkbox"/>	Flooded	<input type="checkbox"/>
<b>Site Conditions</b>								

<b>Ground gas and vapour monitoring</b>				
<b>Atmospheric Pressure (external)</b>	<b>Pre Monitoring:</b>	1029	<b>Post Monitoring:</b>	1028
<b>General Atmospheric Pressure Conditions</b>			Steady/falling	

<b>Exploratory hole identity</b>	<b>BH1</b>	
<b>Flow range</b>	0.1	l/hr
<b>Peak flow</b>	0.1	l/hr
<b>Differential Pressure</b>	0	Pa
<b>Groundwater level</b>	3.82	m bgl
<b>Depth of standpipe and diameter</b>	5.87	50mm (ID)

Seconds	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	Comments:	
15	<0.1	0.5	12	<0.1	<0.1	<0.1		
30	<0.1	0.5	11	<0.1	<0.1	<0.1		
45	<0.1	0.5	10.8	<0.1	<0.1	<0.1		
60	<0.1	0.5	10.7	<0.1	<0.1	<0.1		
90	<0.1	0.5	10.6	<0.1	<0.1	<0.1		
120	<0.1	0.5	10.6	<0.1	<0.1	<0.1		
180	<0.1	0.5	10.5	<0.1	<0.1	<0.1		
Peak State	0	0.5	10.5	0	0	0	<b>PID</b>	<0.1

Exploratory hole identity		BH2B	
Flow range	<0.1	l/hr	
Peak flow	<0.1	l/hr	
Differential Pressure	0	Pa	
Groundwater level	3.51	m bgl	
Depth of standpipe and diameter	4.9	50mm (ID)	

Seconds	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	Comments:	
15	<0.1	0.3	16.5	<0.1	<0.1	<0.1		
30	<0.1	0.3	15.8	<0.1	<0.1	<0.1		
45	<0.1	0.3	15.7	<0.1	<0.1	<0.1		
60	<0.1	0.3	15.6	<0.1	<0.1	<0.1		
90	<0.1	0.3	15.5	<0.1	<0.1	<0.1		
120	<0.1	0.3	15.5	<0.1	<0.1	<0.1		
180	<0.1	0.3	15.5	<0.1	<0.1	<0.1		
Peak State	0	0.3	15.5	0	0	0	PID	<0.1

Exploratory hole identity		WS1	
Flow range	0.4 to 0	l/hr	
Peak flow	0.4	l/hr	
Differential Pressure	0.4	Pa	
Groundwater level	4.48	m bgl	
Depth of standpipe and diameter	4.7	50mm (ID)	

Seconds	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	Comments:	
15	<0.1	0.4	19.4	<0.1	<0.1	<0.1	Flow level fell to 0 within 60 seconds	
30	<0.1	0.4	19.3	<0.1	<0.1	<0.1		
45	<0.1	0.4	19.3	<0.1	<0.1	<0.1		
60	<0.1	0.4	19.3	<0.1	<0.1	<0.1		
90	<0.1	0.4	19.3	<0.1	<0.1	<0.1		
120	<0.1	0.4	19.3	<0.1	<0.1	<0.1		
180	<0.1	0.4	19.3	<0.1	<0.1	<0.1		
Peak State	0	0.4	19.3	0	0	0	PID	<0.1

Exploratory hole identity		WS2	
Flow range	<0.1	l/hr	
Peak flow	<0.1	l/hr	
Differential Pressure	0	Pa	
Groundwater level	Dry	m bgl	
Depth of standpipe and diameter	2.07	50mm (ID)	

Seconds	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	Comments:	
15	<0.1	0.5	18.8	<0.1	<0.1	<0.1		
30	<0.1	0.5	19	<0.1	<0.1	<0.1		
45	<0.1	0.6	19.1	<0.1	<0.1	<0.1		
60	<0.1	0.6	19.1	<0.1	<0.1	<0.1		
90	<0.1	0.6	19.1	<0.1	<0.1	<0.1		
120	<0.1	0.6	19.1	<0.1	<0.1	<0.1		
180	<0.1	0.6	19.1	<0.1	<0.1	<0.1		
Peak State	0	0.6	18.8	0	0	0	PID	<0.1

<b>Exploratory hole identity</b>		<b>WS4</b>	
<b>Flow range</b>	<0.1	l/hr	
<b>Peak flow</b>	<0.1	l/hr	
<b>Differential Pressure</b>	0	Pa	
<b>Groundwater level</b>	4.1	m bgl	
<b>Depth of standpipe and diameter</b>	4.49	50mm (ID)	

Seconds	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	Comments:	
15	<0.1	1.4	17	<0.1	<0.1	<0.1		
30	<0.1	1.4	16	<0.1	<0.1	<0.1		
45	<0.1	1.5	16.3	<0.1	<0.1	<0.1		
60	<0.1	1.5	16.2	<0.1	<0.1	<0.1		
90	<0.1	1.5	16.1	<0.1	<0.1	<0.1		
120	<0.1	1.5	16.1	<0.1	<0.1	<0.1		
180	<0.1	1.5	16.1	<0.1	<0.1	<0.1		
Peak State	0	1.5	16	0	0	0		

<b>Exploratory hole identity</b>		<b>WS5</b>	
<b>Flow range</b>	<0.1	l/hr	
<b>Peak flow</b>	<0.1	l/hr	
<b>Differential Pressure</b>	0	Pa	
<b>Groundwater level</b>	3.09	m bgl	
<b>Depth of standpipe and diameter</b>	3.18	50mm (ID)	

Seconds	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	Comments:	
15	<0.1	<0.1	19.9	<0.1	<0.1	<0.1		
30	<0.1	<0.1	20	<0.1	<0.1	<0.1		
45	<0.1	<0.1	20	<0.1	<0.1	<0.1		
60	<0.1	<0.1	20	<0.1	<0.1	<0.1		
90	<0.1	<0.1	20	<0.1	<0.1	<0.1		
120	<0.1	<0.1	20	<0.1	<0.1	<0.1		
180	<0.1	<0.1	20	<0.1	<0.1	<0.1		
Peak State	0	0	19.9	0	0	0		

<b>Exploratory hole identity</b>		<b>WS7</b>	
<b>Flow range</b>	0.1	l/hr	
<b>Peak flow</b>	0.1	l/hr	
<b>Differential Pressure</b>	0	Pa	
<b>Groundwater level</b>	4.42	m bgl	
<b>Depth of standpipe and diameter</b>	4.52	50mm (ID)	

Seconds	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	Comments:	
15	<0.1	3.9	13.6	<0.1	<0.1	<0.1		
30	<0.1	3.9	13	<0.1	<0.1	<0.1		
45	<0.1	3.9	13	<0.1	<0.1	<0.1		
60	<0.1	4	12.9	<0.1	<0.1	<0.1		
90	<0.1	4	12.9	<0.1	<0.1	<0.1		
120	<0.1	4	12.8	<0.1	<0.1	<0.1		
180	<0.1	4	12.8	<0.1	<0.1	<0.1		
Peak State	0	4	12.8	0	0	0		

Exploratory hole identity		WS8	
Flow range	<0.1	l/hr	
Peak flow	<0.1	l/hr	
Differential Pressure	0	Pa	
Groundwater level	Dry	m bgl	
Depth of standpipe and diameter	2.42	50mm (ID)	

Seconds	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	Comments:	
15	<0.1	<0.1	19.6	<0.1	<0.1	<0.1		
30	<0.1	<0.1	19.7	<0.1	<0.1	<0.1		
45	<0.1	<0.1	19.7	<0.1	<0.1	<0.1		
60	<0.1	<0.1	19.6	<0.1	<0.1	<0.1		
90	<0.1	<0.1	19.6	<0.1	<0.1	<0.1		
120	<0.1	<0.1	19.6	<0.1	<0.1	<0.1		
180	<0.1	<0.1	19.5	<0.1	<0.1	<0.1		
Peak State	0	0	19.5	0	0	0	PID	<0.1

Exploratory hole identity		WS9	
Flow range	0.3 to 0	l/hr	
Peak flow	0.3	l/hr	
Differential Pressure	0.3	Pa	
Groundwater level	Dry	m bgl	
Depth of standpipe and diameter	0.85	50mm (ID)	

Seconds	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	Comments:	
15	<0.1	<0.1	19.3	<0.1	<0.1	<0.1	Flow level fell to 0 within 30 seconds	
30	<0.1	0.1	19	<0.1	<0.1	<0.1		
45	<0.1	0.1	19	<0.1	<0.1	<0.1		
60	<0.1	0.1	18.9	<0.1	<0.1	<0.1		
90	<0.1	0.1	18.6	<0.1	<0.1	<0.1		
120	<0.1	0.1	18.5	<0.1	<0.1	<0.1		
180	<0.1	0.1	18.5	<0.1	<0.1	<0.1		
Peak State	0	0.1	18.5	0	0	0	PID	<0.1

Exploratory hole identity		WS10	
Flow range	<0.1	l/hr	
Peak flow	<0.1	l/hr	
Differential Pressure	0	Pa	
Groundwater level	2.3	m bgl	
Depth of standpipe and diameter	3.9	50mm (ID)	

Seconds	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	LEL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	Comments:	
15	<0.1	<0.1	20.4	<0.1	<0.1	<0.1		
30	<0.1	<0.1	20.3	<0.1	<0.1	<0.1		
45	<0.1	<0.1	20.3	<0.1	<0.1	<0.1		
60	<0.1	<0.1	20.3	<0.1	<0.1	<0.1		
90	<0.1	<0.1	20.3	<0.1	<0.1	<0.1		
120	<0.1	<0.1	20.3	<0.1	<0.1	<0.1		
180	<0.1	<0.1	20.2	<0.1	<0.1	<0.1		
Peak State	0	0	20.2	0	0	0	PID	<0.1

**Appendix F****Results of Laboratory analysis**

- **Laboratory Report Sheets – Soils**
- **Laboratory Report Sheets – Groundwater**



# Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point  
Zone 3  
Deeside Industrial Park  
Deeside  
CH5 2UA

Waterman Infrastructure & Environment Limited  
Pickfords Wharf  
Clink Street  
London  
SE1 9DG

Tel: +44 (0) 1244 833780  
Fax: +44 (0) 1244 833781



**Attention :** Robbie Moore  
**Date :** 10th November, 2016  
**Your reference :** 10667  
**Our reference :** Test Report 16/15446 Batch 4 Schedule D  
**Location :** Stag Brewery  
**Date samples received :** 15th October, 2016  
**Status :** Final report  
**Issue :** 1

Eight samples were received for analysis on 15th October, 2016 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Compiled By:**

**Paul Lee-Boden BSc**  
**Project Manager**

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

**Note:**

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth  
 Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
16/15446	4	WS7A	1.00	217	09/11/2016	Mass of Dry Sample	54.0 (g)
					10/11/2016	General Description (Bulk Analysis)	soil-stones
					10/11/2016	Asbestos Fibres	Fibre Bundles
					10/11/2016	Asbestos ACM	NAD
					10/11/2016	Asbestos Type	Chrysotile
					10/11/2016	Asbestos Level Screen	<0.1%
16/15446	4	WS8A	2.50	229	09/11/2016	Mass of Dry Sample	50.4 (g)
					10/11/2016	General Description (Bulk Analysis)	soil-stones
					10/11/2016	Asbestos Fibres	NAD
					10/11/2016	Asbestos Fibres (2)	NAD
					10/11/2016	Asbestos ACM	NAD
					10/11/2016	Asbestos ACM (2)	NAD
					10/11/2016	Asbestos Type	NAD
					10/11/2016	Asbestos Type (2)	NAD
					10/11/2016	Asbestos Level Screen	NAD



**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 16/15446						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

# NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 16/15446

## SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

## WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

## DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

## SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

## DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

## NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

**ABBREVIATIONS and ACRONYMS USED**

#	ISO17025 (UKAS) accredited - UK.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	



# Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point  
Zone 3  
Deeside Industrial Park  
Deeside  
CH5 2UA

Waterman Infrastructure & Environment Limited  
Pickfords Wharf  
Clink Street  
London  
SE1 9DG

Tel: +44 (0) 1244 833780  
Fax: +44 (0) 1244 833781

**Attention :** Robbie Moore  
**Date :** 15th November, 2016  
**Your reference :** 10667  
**Our reference :** Test Report 16/15446 Batch 4 Schedule E  
**Location :** Stag Brewery  
**Date samples received :** 15th October, 2016  
**Status :** Final report  
**Issue :** 1

Eight samples were received for analysis on 15th October, 2016 of which one were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Compiled By:**

A handwritten signature in black ink, appearing to read 'Paul Lee-Boden'.

**Paul Lee-Boden BSc**  
**Project Manager**

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

**Note:**

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth  
 Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
16/15446	4	WS7A	1.00	217	14/11/2016	<b>Asbestos Gravimetric Quantification</b>	<0.001 (mass %)
					14/11/2016	<b>Asbestos PCOM Quantification (Fibres)</b>	<0.001 (mass %)
					14/11/2016	<b>Asbestos Gravimetric &amp; PCOM Total</b>	<0.001 (mass %)

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 16/15446						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

# NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 16/15446

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It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

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Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

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Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

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As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

## DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

## SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

## DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

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DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

**JE Job No:** 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	



# Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point  
Zone 3  
Deeside Industrial Park  
Deeside  
CH5 2UA

Waterman Infrastructure & Environment Limited  
Pickfords Wharf  
Clink Street  
London  
SE1 9DG

Tel: +44 (0) 1244 833780  
Fax: +44 (0) 1244 833781



**Attention :** Robbie Moore  
**Date :** 8th November, 2016  
**Your reference :** 10667  
**Our reference :** Test Report 16/15446 Batch 1  
**Location :** Stag Brewery  
**Date samples received :** 7th October, 2016  
**Status :** Final report  
**Issue :** 1

Thirty eight samples were received for analysis on 7th October, 2016 of which nine were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Compiled By:**

**Simon Gomery BSc**  
**Project Manager**

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**Report : Solid**

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

J E Sample No.	1-4	9-12	33-36	53-56	73-76	105-108	129-131	136-139	144-147				
Sample ID	WS1	WS1	WS2	WS3	WS4	WS5	WS8	WS10	WS11				
Depth	0.50	1.50	1.50	0.50	0.50	1.00	1.00	1.00	0.50				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	04/10/2016	04/10/2016	04/10/2016	04/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016				
											LOD/LOR	Units	Method No.
Arsenic #	NDP	-	13.3	15.8	8.5	9.5	NDP	13.6	9.0		<0.5	mg/kg	TM30/PM15
Arsenic	12.8	-	-	-	-	-	5.4	-	-		<0.5	mg/kg	TM30/PM62
Barium #	NDP	-	31	62	158	462	NDP	241	130		<1	mg/kg	TM30/PM15
Barium	60	-	-	-	-	-	45	-	-		<1	mg/kg	TM30/PM62
Beryllium	NDP	-	0.5	0.8	<0.5	0.6	NDP	0.9	<0.5		<0.5	mg/kg	TM30/PM15
Beryllium	0.7	-	-	-	-	-	<0.5	-	-		<0.5	mg/kg	TM30/PM62
Cadmium #	NDP	-	0.1	<0.1	0.3	0.8	NDP	0.1	0.2		<0.1	mg/kg	TM30/PM15
Cadmium	<0.1	-	-	-	-	-	<0.1	-	-		<0.1	mg/kg	TM30/PM62
Chromium #	NDP	-	65.0	65.2	32.0	35.0	NDP	55.2	58.7		<0.5	mg/kg	TM30/PM15
Chromium	20.4	-	-	-	-	-	7.7	-	-		<0.5	mg/kg	TM30/PM62
Cobalt #	NDP	-	6.6	7.0	3.5	4.3	NDP	8.9	4.8		<0.5	mg/kg	TM30/PM15
Cobalt	7.2	-	-	-	-	-	2.6	-	-		<0.5	mg/kg	TM30/PM62
Copper #	NDP	-	169	17	15	15	NDP	19	10		<1	mg/kg	TM30/PM15
Copper	14	-	-	-	-	-	4	-	-		<1	mg/kg	TM30/PM62
Lead #	NDP	-	10	89	44	78	NDP	176	35		<5	mg/kg	TM30/PM15
Lead	63	-	-	-	-	-	10	-	-		<5	mg/kg	TM30/PM62
Mercury #	NDP	-	<0.1	0.2	<0.1	<0.1	NDP	0.2	<0.1		<0.1	mg/kg	TM30/PM15
Mercury	<0.1	-	-	-	-	-	<0.1	-	-		<0.1	mg/kg	TM30/PM62
Molybdenum #	NDP	-	2.4	2.3	1.3	1.6	NDP	1.7	3.3		<0.1	mg/kg	TM30/PM15
Molybdenum	0.5	-	-	-	-	-	0.2	-	-		<0.1	mg/kg	TM30/PM62
Nickel #	NDP	-	20.5	19.6	12.7	14.0	NDP	25.4	12.3		<0.7	mg/kg	TM30/PM15
Nickel	17.5	-	-	-	-	-	6.4	-	-		<0.7	mg/kg	TM30/PM62
Selenium #	NDP	-	<1	<1	<1	<1	NDP	<1	<1		<1	mg/kg	TM30/PM15
Selenium	<1	-	-	-	-	-	<1	-	-		<1	mg/kg	TM30/PM62
Total Sulphate #	-	590	-	-	-	-	-	-	-		<50	mg/kg	TM50/PM29
Vanadium	NDP	-	31	44	24	29	NDP	41	29		<1	mg/kg	TM30/PM15
Vanadium	38	-	-	-	-	-	14	-	-		<1	mg/kg	TM30/PM62
Water Soluble Boron #	NDP	-	0.3	1.5	1.3	1.2	NDP	2.7	1.1		<0.1	mg/kg	TM74/PM32
Water Soluble Boron	0.7	-	-	-	-	-	0.3	-	-		<0.1	mg/kg	TM74/PM61
Zinc #	NDP	-	317	47	78	158	NDP	174	65		<5	mg/kg	TM30/PM15
Zinc	37	-	-	-	-	-	27	-	-		<5	mg/kg	TM30/PM62

Please see attached notes for all abbreviations and acronyms

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**Report : Solid**

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

J E Sample No.	1-4	9-12	33-36	53-56	73-76	105-108	129-131	136-139	144-147				
Sample ID	WS1	WS1	WS2	WS3	WS4	WS5	WS8	WS10	WS11				
Depth	0.50	1.50	1.50	0.50	0.50	1.00	1.00	1.00	0.50				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	04/10/2016	04/10/2016	04/10/2016	04/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016				
										LOD/LOR	Units	Method No.	
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	0.37 <sup>AA</sup>	<0.20 <sup>AA</sup>	<0.04	0.07	<0.20 <sup>AA</sup>	<0.04	mg/kg	TM4/PM8	
Acenaphthylene	0.03	<0.03	<0.03	<0.03	<0.15 <sup>AA</sup>	<0.15 <sup>AA</sup>	<0.03	0.03	<0.15 <sup>AA</sup>	<0.03	mg/kg	TM4/PM8	
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	0.29 <sup>AA</sup>	<0.25 <sup>AA</sup>	<0.05	0.06	<0.25 <sup>AA</sup>	<0.05	mg/kg	TM4/PM8	
Fluorene #	<0.04	<0.04	<0.04	<0.04	0.22 <sup>AA</sup>	<0.20 <sup>AA</sup>	<0.04	<0.04	<0.20 <sup>AA</sup>	<0.04	mg/kg	TM4/PM8	
Phenanthrene #	0.23	0.11	<0.03	<0.03	2.74 <sup>AA</sup>	0.84 <sup>AA</sup>	0.03	0.55	0.51 <sup>AA</sup>	<0.03	mg/kg	TM4/PM8	
Anthracene #	0.06	<0.04	<0.04	<0.04	0.66 <sup>AA</sup>	0.23 <sup>AA</sup>	<0.04	0.19	<0.20 <sup>AA</sup>	<0.04	mg/kg	TM4/PM8	
Fluoranthene #	0.44	0.21	<0.03	<0.03	3.37 <sup>AA</sup>	1.13 <sup>AA</sup>	0.05	1.79	0.75 <sup>AA</sup>	<0.03	mg/kg	TM4/PM8	
Pyrene #	0.35	0.20	<0.03	<0.03	2.71 <sup>AA</sup>	1.07 <sup>AA</sup>	0.06	3.20	0.71 <sup>AA</sup>	<0.03	mg/kg	TM4/PM8	
Benzo(a)anthracene #	0.30	0.15	<0.06	<0.06	1.63 <sup>AA</sup>	0.78 <sup>AA</sup>	0.06	1.99	0.52 <sup>AA</sup>	<0.06	mg/kg	TM4/PM8	
Chrysene #	0.23	0.12	<0.02	<0.02	1.22 <sup>AA</sup>	0.71 <sup>AA</sup>	0.03	1.79	0.40 <sup>AA</sup>	<0.02	mg/kg	TM4/PM8	
Benzo(bk)fluoranthene #	0.34	0.18	<0.07	<0.07	1.85 <sup>AA</sup>	0.98 <sup>AA</sup>	<0.07	3.57	0.53 <sup>AA</sup>	<0.07	mg/kg	TM4/PM8	
Benzo(a)pyrene #	0.21	0.10	<0.04	<0.04	0.88 <sup>AA</sup>	0.57 <sup>AA</sup>	<0.04	1.88	0.30 <sup>AA</sup>	<0.04	mg/kg	TM4/PM8	
Indeno(123cd)pyrene #	0.14	0.08	<0.04	<0.04	0.60 <sup>AA</sup>	0.49 <sup>AA</sup>	<0.04	1.51	0.24 <sup>AA</sup>	<0.04	mg/kg	TM4/PM8	
Dibenzo(ah)anthracene #	0.04	<0.04	<0.04	<0.04	<0.20 <sup>AA</sup>	<0.20 <sup>AA</sup>	<0.04	0.27	<0.20 <sup>AA</sup>	<0.04	mg/kg	TM4/PM8	
Benzo(ghi)perylene #	0.12	0.06	<0.04	<0.04	0.51 <sup>AA</sup>	0.38 <sup>AA</sup>	<0.04	1.23	<0.20 <sup>AA</sup>	<0.04	mg/kg	TM4/PM8	
Coronene	<0.04	<0.04	<0.04	<0.04	<0.20 <sup>AA</sup>	<0.20 <sup>AA</sup>	<0.04	0.20	<0.20 <sup>AA</sup>	<0.04	mg/kg	TM4/PM8	
PAH 17 Total	2.49	1.21	<0.64	<0.64	17.05 <sup>AA</sup>	7.18 <sup>AA</sup>	<0.64	18.33	3.96 <sup>AA</sup>	<0.64	mg/kg	TM4/PM8	
Benzo(b)fluoranthene	0.24	0.13	<0.05	<0.05	1.33 <sup>AA</sup>	0.71 <sup>AA</sup>	<0.05	2.57	0.38 <sup>AA</sup>	<0.05	mg/kg	TM4/PM8	
Benzo(k)fluoranthene	0.10	0.05	<0.02	<0.02	0.52 <sup>AA</sup>	0.27 <sup>AA</sup>	<0.02	1.00	0.15 <sup>AA</sup>	<0.02	mg/kg	TM4/PM8	
Benzo(a)pyrene fraction of C6-C40	-	-	-	-	-	-	-	-	-	<0.01	%	TM4/PM8	
PAH Surrogate % Recovery	118	117	111	103	96 <sup>AA</sup>	96 <sup>AA</sup>	112	120	111 <sup>AA</sup>	<0	%	TM4/PM8	
Interpretation - Gasoline	-	N	-	-	-	-	-	-	-		None	TM5/PM8	
Interpretation - Diesel	-	N	-	-	-	-	-	-	-		None	TM5/PM8	
Mineral Oil (C10-C40)	-	<30	-	-	-	-	-	-	-	<30	mg/kg	TM5/PM16	
EPH (C10-C40) with clean up	-	<30	-	-	-	-	-	-	-	<30	mg/kg	TM5/PM16	
TPH (C6-C40)	-	<30	-	-	-	-	-	-	-	<30	mg/kg	TM5/PM16	
TPH CWG													
<b>Aliphatics</b>													
>C5-C6 #	<0.1	-	<0.1 <sup>SV</sup>	<0.1	<0.1 <sup>SV</sup>	<0.1 <sup>SV</sup>	<0.1	<0.1	<0.1 <sup>SV</sup>	<0.1	mg/kg	TM36/PM12	
>C6-C8 #	<0.1	-	<0.1 <sup>SV</sup>	<0.1	<0.1 <sup>SV</sup>	<0.1 <sup>SV</sup>	<0.1	<0.1	<0.1 <sup>SV</sup>	<0.1	mg/kg	TM36/PM12	
>C8-C10	<0.1	-	<0.1 <sup>SV</sup>	<0.1	<0.1 <sup>SV</sup>	<0.1 <sup>SV</sup>	<0.1	<0.1	<0.1 <sup>SV</sup>	<0.1	mg/kg	TM36/PM12	
>C10-C12 #	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM16	
>C12-C16 #	<4	-	40	<4	<4	5	<4	<4	25	<4	mg/kg	TM5/PM16	
>C16-C21 #	<7	-	983	<7	11	21	<7	<7	240	<7	mg/kg	TM5/PM16	
>C21-C35 #	<7	-	7216	<7	224	318	<7	79	245	<7	mg/kg	TM5/PM16	
>C35-C44	<7	-	644	<7	564	413	<7	106	313	<7	mg/kg	TM5/PM16	
Total aliphatics C5-44	<26	-	8883	<26	799	757	<26	185	823	<26	mg/kg	TM5/PM16	

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**Location:** Stag Brewery  
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**JE Job No.:** 16/15446

**Report : Solid**

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

J E Sample No.	1-4	9-12	33-36	53-56	73-76	105-108	129-131	136-139	144-147			
Sample ID	WS1	WS1	WS2	WS3	WS4	WS5	WS8	WS10	WS11			
Depth	0.50	1.50	1.50	0.50	0.50	1.00	1.00	1.00	0.50			
COC No / misc												
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	04/10/2016	04/10/2016	04/10/2016	04/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1			
Date of Receipt	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016			
										LOD/LOR	Units	Method No.
TPH CWG												
<b>Aromatics</b>												
>C5-EC7	<0.1	-	<0.1 <sup>SV</sup>	<0.1	<0.1 <sup>SV</sup>	<0.1 <sup>SV</sup>	<0.1	<0.1	<0.1 <sup>SV</sup>	<0.1	mg/kg	TM36/PM12
>EC7-EC8	<0.1	-	<0.1 <sup>SV</sup>	<0.1	<0.1 <sup>SV</sup>	<0.1 <sup>SV</sup>	<0.1	<0.1	<0.1 <sup>SV</sup>	<0.1	mg/kg	TM36/PM12
>EC8-EC10 <sup>#</sup>	<0.1	-	<0.1 <sup>SV</sup>	<0.1	<0.1 <sup>SV</sup>	<0.1 <sup>SV</sup>	<0.1	<0.1	<0.1 <sup>SV</sup>	<0.1	mg/kg	TM36/PM12
>EC10-EC12	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM16
>EC12-EC16	<4	-	<4	<4	7	6	<4	<4	9	<4	mg/kg	TM5/PM16
>EC16-EC21	<7	-	221	<7	34	28	<7	19	105	<7	mg/kg	TM5/PM16
>EC21-EC35	<7	-	3553	<7	607	730	<7	218	424	<7	mg/kg	TM5/PM16
>EC35-EC44	<7	-	700	<7	1827	2178	<7	568	1079	<7	mg/kg	TM5/PM16
Total aromatics C5-44	<26	-	4474	<26	2475	2942	<26	805	1617	<26	mg/kg	TM5/TM36/PM16
Total aliphatics and aromatics(C5-44)	<52	-	13357	<52	3274	3699	<52	990	2440	<52	mg/kg	TM5/TM36/PM16
GRO (>C4-C8) <sup>#</sup>	-	<100	-	-	-	-	-	-	-	<100	ug/kg	TM36/PM12
GRO (>C8-C12) <sup>#</sup>	-	<100	-	-	-	-	-	-	-	<100	ug/kg	TM36/PM12
GRO (>C4-12) <sup>#</sup>	-	<100	-	-	-	-	-	-	-	<100	ug/kg	TM36/PM12
GRO (C6-C10)	-	<0.1	-	-	-	-	-	-	-	<0.1	mg/kg	TM36/PM12
MTBE <sup>#</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	<0.005 <sup>SV</sup>	<0.005 <sup>SV</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	mg/kg	TM31/PM12
Benzene <sup>#</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	<0.005 <sup>SV</sup>	<0.005 <sup>SV</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	mg/kg	TM31/PM12
Toluene <sup>#</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	<0.005 <sup>SV</sup>	<0.005 <sup>SV</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	mg/kg	TM31/PM12
Ethylbenzene <sup>#</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	<0.005 <sup>SV</sup>	<0.005 <sup>SV</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	mg/kg	TM31/PM12
m/p-Xylene <sup>#</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	<0.005 <sup>SV</sup>	<0.005 <sup>SV</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	mg/kg	TM31/PM12
o-Xylene <sup>#</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	<0.005 <sup>SV</sup>	<0.005 <sup>SV</sup>	<0.005	<0.005	<0.005 <sup>SV</sup>	<0.005	mg/kg	TM31/PM12
PCB 28 <sup>#</sup>	-	<5	-	-	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 52 <sup>#</sup>	-	<5	-	-	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 101 <sup>#</sup>	-	<5	-	-	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 118 <sup>#</sup>	-	<5	-	-	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 138 <sup>#</sup>	-	<5	-	-	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 153 <sup>#</sup>	-	<5	-	-	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 180 <sup>#</sup>	-	<5	-	-	-	-	-	-	-	<5	ug/kg	TM17/PM8
Total 7 PCBs <sup>#</sup>	-	<35	-	-	-	-	-	-	-	<35	ug/kg	TM17/PM8
Natural Moisture Content	NDP	3.4	18.9	10.5	6.1	5.8	NDP	16.2	7.5	<0.1	%	PM4/PM0
Chloride <sup>#</sup>	-	10	-	-	-	-	-	-	-	<2	mg/kg	TM38/PM20
Hexavalent Chromium <sup>#</sup>	<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Total Organic Carbon <sup>#</sup>	-	0.12	-	-	-	-	-	-	-	<0.02	%	TM21/PM24
Organic Matter	-	0.2	-	-	-	-	-	-	-	<0.2	%	TM21/PM24
ANC at pH4	-	0.58	-	-	-	-	-	-	-	<0.03	mol/kg	TM77/PM0
ANC at pH7	-	0.05	-	-	-	-	-	-	-	<0.03	mol/kg	TM77/PM0
Loss on Ignition <sup>#</sup>	-	1.5	-	-	-	-	-	-	-	<1.0	%	TM22/PM0

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Contact: Robbie Moore  
JE Job No.: 16/15446

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

J E Sample No.	1-4	9-12	33-36	53-56	73-76	105-108	129-131	136-139	144-147	Please see attached notes for all abbreviations and acronyms		
Sample ID	WS1	WS1	WS2	WS3	WS4	WS5	WS8	WS10	WS11	LOD/LOR	Units	Method No.
Depth	0.50	1.50	1.50	0.50	0.50	1.00	1.00	1.00	0.50			
COC No / misc												
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	04/10/2016	04/10/2016	04/10/2016	04/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1			
Date of Receipt	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016			
pH #	-	9.09	-	-	-	-	-	-	-	<0.01	pH units	TM73/PM11

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**SVOC Report :** Solid

J E Sample No.	1-4	33-36	53-56	73-76	105-108	129-131	136-139	144-147					
Sample ID	WS1	WS2	WS3	WS4	WS5	WS8	WS10	WS11					
Depth	0.50	1.50	0.50	0.50	1.00	1.00	1.00	0.50					
COC No / misc Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	04/10/2016	04/10/2016	04/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016					
										LOD/LOR	Units	Method No.	
SVOC MS													
<b>Phenols</b>													
2-Chlorophenol #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
2-Methylphenol	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
2-Nitrophenol	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
2,4-Dichlorophenol #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
2,4-Dimethylphenol	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
2,4,5-Trichlorophenol	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
2,4,6-Trichlorophenol	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
4-Chloro-3-methylphenol	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
4-Methylphenol	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
4-Nitrophenol	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Pentachlorophenol	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Phenol #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
<b>PAHs</b>													
2-Chloronaphthalene #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
2-Methylnaphthalene #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
<b>Phthalates</b>													
Bis(2-ethylhexyl) phthalate	<100	5712	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>		<100	ug/kg	TM16/PM8	
Butylbenzyl phthalate	<100	<100	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>		<100	ug/kg	TM16/PM8	
Di-n-butyl phthalate	<100	<100	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>		<100	ug/kg	TM16/PM8	
Di-n-Octyl phthalate	<100	<100	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>		<100	ug/kg	TM16/PM8	
Diethyl phthalate	<100	<100	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>		<100	ug/kg	TM16/PM8	
Dimethyl phthalate #	<100	<100	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>	<100	<1000 <sub>AB</sub>	<1000 <sub>AB</sub>		<100	ug/kg	TM16/PM8	
<b>Other SVOCs</b>													
1,2-Dichlorobenzene	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
1,2,4-Trichlorobenzene #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
1,3-Dichlorobenzene	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
1,4-Dichlorobenzene	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
2-Nitroaniline	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
2,4-Dinitrotoluene	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
2,6-Dinitrotoluene	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
3-Nitroaniline	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
4-Bromophenylphenylether #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
4-Chloroaniline	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
4-Chlorophenylphenylether	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
4-Nitroaniline	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Azobenzene	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Bis(2-chloroethoxy)methane	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Bis(2-chloroethyl)ether	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Carbazole	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Dibenzofuran #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Hexachlorobenzene	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Hexachlorobutadiene #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Hexachlorocyclopentadiene	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Hexachloroethane	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Isophorone #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
N-nitrosodi-n-propylamine #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Nitrobenzene #	<10	<10	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>	<10	<100 <sub>AB</sub>	<100 <sub>AB</sub>		<10	ug/kg	TM16/PM8	
Surrogate Recovery 2-Fluorobiphenyl	98	96	74	82 <sub>AB</sub>	81 <sub>AB</sub>	81	64 <sub>AB</sub>	85 <sub>AB</sub>		<0	%	TM16/PM8	
Surrogate Recovery p-Terphenyl-d14	107	101	90	87 <sub>AB</sub>	89 <sub>AB</sub>	100	85 <sub>AB</sub>	94 <sub>AB</sub>		<0	%	TM16/PM8	

Please see attached notes for all abbreviations and acronyms



**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**VOC Report :** Solid

J E Sample No.	1-4	33-36	53-56	73-76	105-108	129-131	136-139	144-147				
Sample ID	WS1	WS2	WS3	WS4	WS5	WS8	WS10	WS11				
Depth	0.50	1.50	0.50	0.50	1.00	1.00	1.00	0.50				
COC No / misc Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	04/10/2016	04/10/2016	04/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016	03/10/2016				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1				
Date of Receipt	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016	07/10/2016				
									LOD/LOR	Units	Method No.	
VOC MS												
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10	
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10	
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Vinyl Chloride	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15_A/PM10	
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1	<1	ug/kg	TM15/PM10	
Chloroethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10	
Trichlorofluoromethane #	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10	
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10	
Dichloromethane (DCM) #	<7	44	54	90	34	<7	49	53	<7	ug/kg	TM15/PM10	
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
2,2-Dichloropropane	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
Bromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Chloroform #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
1,1,1-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Carbon tetrachloride #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
1,2-Dichloroethane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
Benzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Trichloroethene (TCE) #	6	8	8	10	<3	<3	<3	12	<3	ug/kg	TM15/PM10	
1,2-Dichloropropane #	<6	<6	<6	<6	<6	<6	<6	<6	<6	ug/kg	TM15/PM10	
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Bromodichloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
cis-1-3-Dichloropropene	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
Toluene #	<3	<3	<3	4	4	<3	<3	4	<3	ug/kg	TM15/PM10	
trans-1-3-Dichloropropene	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
1,1,2-Trichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Tetrachloroethene (PCE) #	<3	<3	6	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
1,3-Dichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Dibromochloromethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
1,2-Dibromoethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Chlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
1,1,1,2-Tetrachloroethane	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Ethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
p/m-Xylene #	<5	<5	<5	6	6	<5	<5	<5	<5	ug/kg	TM15/PM10	
o-Xylene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Styrene	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15_A/PM10	
Bromoform	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
Bromobenzene	<2	<2	<2	<2	<2	<2	<2	<2	<2	ug/kg	TM15/PM10	
1,2,3-Trichloropropane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
Propylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
2-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	8	<3	<3	<3	<3	ug/kg	TM15/PM10	
4-Chlorotoluene	<3	<3	<3	<3	<3	<3	<3	<3	<3	ug/kg	TM15/PM10	
tert-Butylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM15/PM10	
1,2,4-Trimethylbenzene #	<6	<6	<6	<6	57	<6	<6	<6	<6	ug/kg	TM15/PM10	
sec-Butylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
4-Isopropyltoluene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
1,3-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
1,4-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
n-Butylbenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
1,2-Dichlorobenzene #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
1,2-Dibromo-3-chloropropane #	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
1,2,4-Trichlorobenzene #	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10	
Hexachlorobutadiene	<4	<4	<4	<4	<4	<4	<4	<4	<4	ug/kg	TM15/PM10	
Naphthalene	<27	<27	<27	45	<27	<27	55	<27	<27	ug/kg	TM15/PM10	
1,2,3-Trichlorobenzene #	<7	<7	<7	<7	<7	<7	<7	<7	<7	ug/kg	TM15/PM10	
Surrogate Recovery Toluene D8	128	69	103	77	84	103	98	82	<0	%	TM15/PM10	
Surrogate Recovery 4-Bromofluorobenzene	124	70	92	66	76	109	97	74	<0	%	TM15/PM10	

Please see attached notes for all abbreviations and acronyms

Mass of sample taken (kg)	-	Moisture Content Ratio (%) =	11.9		
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	89.4		
Particle Size <4mm =	>95%				
<b>JEFL Job No</b>	<b>16/15446</b>		<b>Landfill Waste Acceptance Criteria Limits</b>		
<b>Sample No</b>	<b>11</b>				
<b>Client Sample No</b>	<b>WS1</b>		<b>Inert Waste Landfill</b>	<b>Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>
<b>Depth/Other</b>	<b>1.50</b>				
<b>Sample Date</b>	<b>04/10/2016</b>				
<b>Batch No</b>	<b>1</b>				
<b>Solid Waste Analysis</b>					
Total Organic Carbon (%)	0.12				
Loss on Ignition (%)	1.5		-	-	10
Sum of BTEX (mg/kg)	<0.025		6	-	-
Sum of 7 PCBs (mg/kg)	<0.035		1	-	-
Mineral Oil (mg/kg)	<30		500	-	-
PAH Sum of 17(mg/kg)	1.21		100	-	-
pH (pH Units)	9.09		-	>6	-
ANC to pH 7 (mol/kg)	0.05		-	to be evaluated	to be evaluated
ANC to pH 4 (mol/kg)	0.58		-	to be evaluated	to be evaluated
<b>Eluate Analysis</b>	<b>10:1 conc<sup>n</sup> leached</b>		<b>Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg</b>		
	<b>C<sub>10</sub></b>	<b>A<sub>10</sub></b>			
	<b>mg/l</b>	<b>mg/kg</b>	<b>mg/kg</b>		
Arsenic	0.0119	0.119	0.5	2	25
Barium	<0.003	<0.03	20	100	300
Cadmium	<0.0005	<0.005	0.04	1	5
Chromium	<0.0015	<0.015	0.5	10	70
Copper	<0.007	<0.07	2	50	100
Mercury	<0.001	<0.01	0.01	0.2	2
Molybdenum	0.003	0.03	0.5	10	30
Nickel	<0.002	<0.02	0.4	10	40
Lead	<0.005	<0.05	0.5	10	50
Antimony	0.002	<0.02	0.06	0.7	5
Selenium	<0.003	<0.03	0.1	0.5	7
Zinc	0.005	0.05	4	50	200
Chloride	1.0	10	800	15000	25000
Fluoride	<0.3	<3	10	150	500
Sulphate as SO4	12.28	122.8	1000	20000	50000
Total Dissolved Solids	83	830	4000	60000	100000
Phenol	<0.01	<0.1	1	-	-
Dissolved Organic Carbon	5	50	500	800	1000



**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

**Note:**

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth  
 Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
16/15446	1	WS1	0.50	2	11/10/2016	<b>General Description (Bulk Analysis)</b>	soil-stones
					11/10/2016	<b>Asbestos Fibres</b>	Fibre Bundles
					11/10/2016	<b>Asbestos ACM</b>	NAD
					11/10/2016	<b>Asbestos Type</b>	Chrysotile
					11/10/2016	<b>Asbestos Level Screen</b>	<0.1%
					20/10/2016	<b>Asbestos Gravimetric Quantification</b>	<0.001 (mass %)
					20/10/2016	<b>Asbestos PCOM Quantification (Fibres)</b>	<0.001 (mass %)
					20/10/2016	<b>Asbestos Gravimetric &amp; PCOM Total</b>	<0.001 (mass %)
16/15446	1	WS8	1.00	130	11/10/2016	<b>General Description (Bulk Analysis)</b>	soil-stones
					11/10/2016	<b>Asbestos Fibres</b>	Fibre Bundles
					11/10/2016	<b>Asbestos Fibres (2)</b>	Free Fibres
					11/10/2016	<b>Asbestos ACM</b>	NAD
					11/10/2016	<b>Asbestos ACM (2)</b>	NAD
					11/10/2016	<b>Asbestos Type</b>	Chrysotile
					11/10/2016	<b>Asbestos Type (2)</b>	Amosite
					11/10/2016	<b>Asbestos Level Screen</b>	<0.1%
					20/10/2016	<b>Asbestos Gravimetric Quantification</b>	<0.001 (mass %)
					20/10/2016	<b>Asbestos PCOM Quantification (Fibres)</b>	<0.001 (mass %)
					20/10/2016	<b>Asbestos Gravimetric &amp; PCOM Total</b>	<0.001 (mass %)



**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

**Matrix : Solid**

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
16/15446	1	WS1	0.50	1-4	GRO, VOC	Solid Samples were received at a temperature above 9°C.
16/15446	1	WS1	1.50	9-12	GRO	Solid Samples were received at a temperature above 9°C.
16/15446	1	WS2	1.50	33-36	GRO, VOC	Solid Samples were received at a temperature above 9°C.
16/15446	1	WS3	0.50	53-56	GRO, VOC	Solid Samples were received at a temperature above 9°C.
16/15446	1	WS4	0.50	73-76	GRO, VOC	Solid Samples were received at a temperature above 9°C.
16/15446	1	WS5	1.00	105-108	GRO, VOC	Solid Samples were received at a temperature above 9°C.
16/15446	1	WS8	1.00	129-131	GRO, VOC	Solid Samples were received at a temperature above 9°C.
16/15446	1	WS10	1.00	136-139	GRO, VOC	Solid Samples were received at a temperature above 9°C.
16/15446	1	WS11	0.50	144-147	GRO, VOC	Solid Samples were received at a temperature above 9°C.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.  
Only analyses which are accredited are recorded as deviating if set criteria are not met.

# NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 16/15446

## SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

## WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

## DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

## SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

## DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

## NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

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

**ABBREVIATIONS and ACRONYMS USED**

#	ISO17025 (UKAS) accredited - UK.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution



JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of BTEX and calculation of Aliphatic fractions.	PM12/PM16	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis./Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of BTEX and calculation of Aliphatic fractions.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.			AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified USEPA 160.4. Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (450°C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM27	Modified US EPA method 9056.Determination of water soluble anions using Dionex (Ion-Chromatography).	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes		AR	Yes

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen and hydrazine. Samples are extracted using an orbital shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen and hydrazine. Samples are extracted using an orbital shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes		AD	Yes
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM61	As received solid samples are extracted with hot water in a 20:1 ratio of water to soil ready for analysis by ICP.			AR	Yes

**JE Job No:** 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM77	Modified DDCEN/TS method 15364:2006. Determination of Acid Neutralization Capacity by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	No
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	
TM15_A	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes



# Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point  
Zone 3  
Deeside Industrial Park  
Deeside  
CH5 2UA

Waterman Infrastructure & Environment Limited  
Pickfords Wharf  
Clink Street  
London  
SE1 9DG

Tel: +44 (0) 1244 833780  
Fax: +44 (0) 1244 833781



**Attention :** Robbie Moore  
**Date :** 8th November, 2016  
**Your reference :** 10667  
**Our reference :** Test Report 16/15446 Batch 2  
**Location :** Stag Brewery  
**Date samples received :** 8th October, 2016  
**Status :** Final report  
**Issue :** 1

Fourteen samples were received for analysis on 8th October, 2016 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Compiled By:**

**Simon Gomery BSc**  
**Project Manager**

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**Report : Solid**

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

J E Sample No.	148-151	156-159	180-183	192-195	200-203						Please see attached notes for all abbreviations and acronyms			
Sample ID	BH1	BH1	BH2	BH2	WS7									
Depth	0.50	1.50	1.00	2.50	0.70									
COC No / misc														
Containers	V J T	V J T	V J T	V J T	V J T									
Sample Date	04/10/2016	04/10/2016	03/10/2016	03/10/2016	05/10/2016									
Sample Type	Soil	Soil	Soil	Soil	Soil									
Batch Number	2	2	2	2	2									
Date of Receipt	08/10/2016	08/10/2016	08/10/2016	08/10/2016	08/10/2016						LOD/LOR	Units	Method No.	
Arsenic #	12.5	-	NDP	-	<0.5						<0.5	mg/kg	TM30/PM15	
Arsenic	-	-	8.0	-	-						<0.5	mg/kg	TM30/PM62	
Barium #	625	-	NDP	-	<1						<1	mg/kg	TM30/PM15	
Barium	-	-	162	-	-						<1	mg/kg	TM30/PM62	
Beryllium	<0.5	-	NDP	-	<0.5						<0.5	mg/kg	TM30/PM15	
Beryllium	-	-	1.3	-	-						<0.5	mg/kg	TM30/PM62	
Cadmium #	1.8	-	NDP	-	<0.1						<0.1	mg/kg	TM30/PM15	
Cadmium	-	-	0.2	-	-						<0.1	mg/kg	TM30/PM62	
Chromium #	42.2	-	NDP	-	<0.5						<0.5	mg/kg	TM30/PM15	
Chromium	-	-	37.5	-	-						<0.5	mg/kg	TM30/PM62	
Cobalt #	3.6	-	NDP	-	<0.5						<0.5	mg/kg	TM30/PM15	
Cobalt	-	-	7.2	-	-						<0.5	mg/kg	TM30/PM62	
Copper #	7	-	NDP	-	<1						<1	mg/kg	TM30/PM15	
Copper	-	-	24	-	-						<1	mg/kg	TM30/PM62	
Lead #	85	-	NDP	-	<5						<5	mg/kg	TM30/PM15	
Lead	-	-	133	-	-						<5	mg/kg	TM30/PM62	
Mercury #	<0.1	-	NDP	-	<0.1						<0.1	mg/kg	TM30/PM15	
Mercury	-	-	<0.1	-	-						<0.1	mg/kg	TM30/PM62	
Molybdenum #	2.3	-	NDP	-	<0.1						<0.1	mg/kg	TM30/PM15	
Molybdenum	-	-	2.4	-	-						<0.1	mg/kg	TM30/PM62	
Nickel #	11.2	-	NDP	-	<0.7						<0.7	mg/kg	TM30/PM15	
Nickel	-	-	24.8	-	-						<0.7	mg/kg	TM30/PM62	
Selenium #	1	-	NDP	-	<1						<1	mg/kg	TM30/PM15	
Selenium	-	-	<1	-	-						<1	mg/kg	TM30/PM62	
Total Sulphate #	-	332	-	1903	-						<50	mg/kg	TM50/PM29	
Vanadium	18	-	NDP	-	<1						<1	mg/kg	TM30/PM15	
Vanadium	-	-	47	-	-						<1	mg/kg	TM30/PM62	
Water Soluble Boron #	1.0	-	NDP	-	1.6						<0.1	mg/kg	TM74/PM32	
Water Soluble Boron	-	-	1.6	-	-						<0.1	mg/kg	TM74/PM61	
Zinc #	123	-	NDP	-	<5						<5	mg/kg	TM30/PM15	
Zinc	-	-	128	-	-						<5	mg/kg	TM30/PM62	

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**Report :** Solid

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

J E Sample No.	148-151	156-159	180-183	192-195	200-203															
Sample ID	BH1	BH1	BH2	BH2	WS7															
Depth	0.50	1.50	1.00	2.50	0.70															
COC No / misc																				
Containers	V J T	V J T	V J T	V J T	V J T															
Sample Date	04/10/2016	04/10/2016	03/10/2016	03/10/2016	05/10/2016															
Sample Type	Soil	Soil	Soil	Soil	Soil															
Batch Number	2	2	2	2	2															
Date of Receipt	08/10/2016	08/10/2016	08/10/2016	08/10/2016	08/10/2016															
Please see attached notes for all abbreviations and acronyms																				
																	LOD/LOR	Units	Method No.	
<b>PAH MS</b>																				
Naphthalene #	<0.04	<0.04	<0.04	<0.04	0.06													<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	0.04													<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	0.06													<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	0.04													<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	0.07	0.47	<0.03	0.82													<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	0.10	<0.04	0.24													<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.05	0.14	0.64	0.03	1.79													<0.03	mg/kg	TM4/PM8
Pyrene #	0.05	0.13	0.52	0.03	1.85													<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.07	0.11	0.33	<0.06	1.18													<0.06	mg/kg	TM4/PM8
Chrysene #	0.04	0.07	0.27	0.02	1.08													<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	0.11	0.40	<0.07	1.74													<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	0.05	0.22	<0.04	0.82													<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	0.16	<0.04	0.77													<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	0.12													<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	0.13	<0.04	0.57													<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	0.09													<0.04	mg/kg	TM4/PM8
PAH 17 Total	<0.64	0.68	3.24	<0.64	11.27													<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	0.08	0.29	<0.05	1.25													<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	0.03	0.11	<0.02	0.49													<0.02	mg/kg	TM4/PM8
Benzo(a)pyrene fraction of C6-C40	-	<0.01	-	<0.01	-													<0.01	%	TM4/PM8
PAH Surrogate % Recovery	117	120	120	102	115													<0	%	TM4/PM8
Interpretation - Gasoline	-	N	-	N	-														None	TM5/PM8
Interpretation - Diesel	-	N	-	N	-														None	TM5/PM8
Mineral Oil (C10-C40)	-	<30	-	<30	-													<30	mg/kg	TM5/PM16
EPH (C10-C40) with clean up	-	<30	-	<30	-													<30	mg/kg	TM5/PM16
TPH (C6-C40)	-	<30	-	<30	-													<30	mg/kg	TM5/PM8/PM12/PM16
<b>TPH CWG</b>																				
<b>Aliphatics</b>																				
>C5-C6 #	<0.1	-	<0.1	-	<0.1													<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	-	<0.1	-	<0.1													<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	-	<0.1	-	<0.1													<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	-	<0.2	-	<0.2													<0.2	mg/kg	TM5/PM16
>C12-C16 #	<4	-	<4	-	<4													<4	mg/kg	TM5/PM16
>C16-C21 #	<7	-	11	-	14													<7	mg/kg	TM5/PM16
>C21-C35 #	<7	-	158	-	111													<7	mg/kg	TM5/PM16
>C35-C44	<7	-	153	-	67													<7	mg/kg	TM5/PM16
Total aliphatics C5-44	<26	-	322	-	192													<26	mg/kg	TM5/PM16/PM12



**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**Report : Solid**

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

J E Sample No.	148-151	156-159	180-183	192-195	200-203													
Sample ID	BH1	BH1	BH2	BH2	WS7													
Depth	0.50	1.50	1.00	2.50	0.70													
COC No / misc																		
Containers	V J T	V J T	V J T	V J T	V J T													
Sample Date	04/10/2016	04/10/2016	03/10/2016	03/10/2016	05/10/2016													
Sample Type	Soil	Soil	Soil	Soil	Soil													
Batch Number	2	2	2	2	2													
Date of Receipt	08/10/2016	08/10/2016	08/10/2016	08/10/2016	08/10/2016													
						LOD/LOR	Units	Method No.										
TPH CWG																		
<b>Aromatics</b>																		
>C5-EC7	<0.1	-	<0.1	-	<0.1	<0.1	mg/kg	TM36/PM12										
>EC7-EC8	<0.1	-	<0.1	-	<0.1	<0.1	mg/kg	TM36/PM12										
>EC8-EC10 <sup>#</sup>	<0.1	-	<0.1	-	<0.1	<0.1	mg/kg	TM36/PM12										
>EC10-EC12	<0.2	-	<0.2	-	<0.2	<0.2	mg/kg	TM5/PM16										
>EC12-EC16	<4	-	<4	-	<4	<4	mg/kg	TM5/PM16										
>EC16-EC21	<7	-	<7	-	<7	<7	mg/kg	TM5/PM16										
>EC21-EC35	<7	-	161	-	98	<7	mg/kg	TM5/PM16										
>EC35-EC44	<7	-	338	-	129	<7	mg/kg	TM5/PM16										
Total aromatics C5-44	<26	-	499	-	227	<26	mg/kg	TM5/TM36/PM16										
Total aliphatics and aromatics(C5-44)	<52	-	821	-	419	<52	mg/kg	TM5/TM36/PM16										
GRO (>C4-C8) <sup>#</sup>	-	<100	-	<100	-	<100	ug/kg	TM36/PM12										
GRO (>C8-C12) <sup>#</sup>	-	<100	-	<100	-	<100	ug/kg	TM36/PM12										
GRO (>C4-12) <sup>#</sup>	-	<100	-	<100	-	<100	ug/kg	TM36/PM12										
GRO (C6-C10)	-	<0.1	-	<0.1	-	<0.1	mg/kg	TM36/PM12										
MTBE <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM31/PM12										
MTBE <sup>#</sup>	<0.005	-	<0.005	-	<0.005	<0.005	mg/kg	TM31/PM12										
Benzene <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM31/PM12										
Benzene <sup>#</sup>	<0.005	-	<0.005	-	<0.005	<0.005	mg/kg	TM31/PM12										
Toluene <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM31/PM12										
Toluene <sup>#</sup>	<0.005	-	<0.005	-	<0.005	<0.005	mg/kg	TM31/PM12										
Ethylbenzene <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM31/PM12										
Ethylbenzene <sup>#</sup>	<0.005	-	<0.005	-	<0.005	<0.005	mg/kg	TM31/PM12										
m/p-Xylene <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM31/PM12										
m/p-Xylene <sup>#</sup>	<0.005	-	<0.005	-	<0.005	<0.005	mg/kg	TM31/PM12										
o-Xylene <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM31/PM12										
o-Xylene <sup>#</sup>	<0.005	-	<0.005	-	<0.005	<0.005	mg/kg	TM31/PM12										
PCB 28 <sup>#</sup>	-	<5	-	8	-	<5	ug/kg	TM17/PM8										
PCB 52 <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM17/PM8										
PCB 101 <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM17/PM8										
PCB 118 <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM17/PM8										
PCB 138 <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM17/PM8										
PCB 153 <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM17/PM8										
PCB 180 <sup>#</sup>	-	<5	-	<5	-	<5	ug/kg	TM17/PM8										
Total 7 PCBs <sup>#</sup>	-	<35	-	<35	-	<35	ug/kg	TM17/PM8										
Natural Moisture Content	5.9	17.9	NDP	13.2	7.8	<0.1	%	PM4/PM0										
Chloride <sup>#</sup>	-	4	-	44	-	<2	mg/kg	TM38/PM20										
Hexavalent Chromium <sup>#</sup>	<0.3	-	<0.3	-	<0.3	<0.3	mg/kg	TM38/PM20										

Please see attached notes for all abbreviations and acronyms



**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**SVOC Report :** Solid

J E Sample No.	148-151	156-159	180-183	192-195	200-203									
Sample ID	BH1	BH1	BH2	BH2	WS7									
Depth	0.50	1.50	1.00	2.50	0.70									
COC No / misc														
Containers	V J T	V J T	V J T	V J T	V J T									
Sample Date	04/10/2016	04/10/2016	03/10/2016	03/10/2016	05/10/2016									
Sample Type	Soil	Soil	Soil	Soil	Soil									
Batch Number	2	2	2	2	2									
Date of Receipt	08/10/2016	08/10/2016	08/10/2016	08/10/2016	08/10/2016									
											LOD/LOR	Units	Method No.	
SVOC MS														
<b>Phenols</b>														
2-Chlorophenol #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
2-Methylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
2-Nitrophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
2,4-Dichlorophenol #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
2,4-Dimethylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
2,4,5-Trichlorophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
2,4,6-Trichlorophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
4-Chloro-3-methylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
4-Methylphenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
4-Nitrophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Pentachlorophenol	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Phenol #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
<b>PAHs</b>														
2-Chloronaphthalene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
2-Methylnaphthalene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
<b>Phthalates</b>														
Bis(2-ethylhexyl) phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8	
Butylbenzyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8	
Di-n-butyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8	
Di-n-Octyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8	
Diethyl phthalate	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8	
Dimethyl phthalate #	<100	<100	<100	<100	<100						<100	ug/kg	TM16/PM8	
<b>Other SVOCs</b>														
1,2-Dichlorobenzene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
1,2,4-Trichlorobenzene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
1,3-Dichlorobenzene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
1,4-Dichlorobenzene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
2-Nitroaniline	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
2,4-Dinitrotoluene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
2,6-Dinitrotoluene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
3-Nitroaniline	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
4-Bromophenylphenylether #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
4-Chloroaniline	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
4-Chlorophenylphenylether	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
4-Nitroaniline	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Azobenzene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Bis(2-chloroethoxy)methane	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Bis(2-chloroethyl)ether	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Carbazole	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Dibenzofuran #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Hexachlorobenzene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Hexachlorobutadiene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Hexachloroethane	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Isophorone #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
N-nitrosodi-n-propylamine #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Nitrobenzene #	<10	<10	<10	<10	<10						<10	ug/kg	TM16/PM8	
Surrogate Recovery 2-Fluorobiphenyl	76	76	83	77	87						<0	%	TM16/PM8	
Surrogate Recovery p-Terphenyl-d14	121	125	117	115	129						<0	%	TM16/PM8	

Please see attached notes for all abbreviations and acronyms



Mass of sample taken (kg)	-	Moisture Content Ratio (%) =	17.7		
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	85.0		
Particle Size <4mm =	>95%				
<b>JEFL Job No</b>	<b>16/15446</b>		<b>Landfill Waste Acceptance Criteria Limits</b>		
<b>Sample No</b>	<b>158</b>				
<b>Client Sample No</b>	<b>BH1</b>				
<b>Depth/Other</b>	<b>1.50</b>				
<b>Sample Date</b>	<b>04/10/2016</b>				
<b>Batch No</b>	<b>2</b>				
<b>Solid Waste Analysis</b>					
Total Organic Carbon (%)	0.86		3		
Loss on Ignition (%)	3.8		-		
Sum of BTEX (mg/kg)	<0.025		6		
Sum of 7 PCBs (mg/kg)	<0.035		1		
Mineral Oil (mg/kg)	<30		500		
PAH Sum of 17(mg/kg)	0.68		100		
pH (pH Units)	8.48		-		
ANC to pH 7 (mol/kg)	<0.03		-		
ANC to pH 4 (mol/kg)	0.06		-		
			to be evaluated		
			to be evaluated		
<b>Eluate Analysis</b>	<b>10:1 conc<sup>n</sup> leached</b>		<b>Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg</b>		
	<b>C<sub>10</sub></b>	<b>A<sub>10</sub></b>	<b>mg/kg</b>		
	<b>mg/l</b>	<b>mg/kg</b>			
Arsenic	0.0056	0.056	0.5	2	25
Barium	<0.003	<0.03	20	100	300
Cadmium	<0.0005	<0.005	0.04	1	5
Chromium	0.0109	0.109	0.5	10	70
Copper	<0.007	<0.07	2	50	100
Mercury	<0.001	<0.01	0.01	0.2	2
Molybdenum	0.019	0.19	0.5	10	30
Nickel	<0.002	<0.02	0.4	10	40
Lead	<0.005	<0.05	0.5	10	50
Antimony	<0.002	<0.02	0.06	0.7	5
Selenium	<0.003	<0.03	0.1	0.5	7
Zinc	<0.003	<0.03	4	50	200
Chloride	0.6	6	800	15000	25000
Fluoride	1.0	10	10	150	500
Sulphate as SO4	13.26	132.6	1000	20000	50000
Total Dissolved Solids	74	740	4000	60000	100000
Phenol	<0.01	<0.1	1	-	-
Dissolved Organic Carbon	7	70	500	800	1000

Mass of sample taken (kg)	-	Moisture Content Ratio (%) =	25.4					
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	79.7					
Particle Size <4mm =	>95%							
<b>JEFL Job No</b>	<b>16/15446</b>		<b>Landfill Waste Acceptance Criteria Limits</b>					
<b>Sample No</b>	<b>194</b>							
<b>Client Sample No</b>	<b>BH2</b>							
<b>Depth/Other</b>	<b>2.50</b>							
<b>Sample Date</b>	<b>03/10/2016</b>							
<b>Batch No</b>	<b>2</b>							
<b>Solid Waste Analysis</b>			<b>Inert Waste Landfill</b>	<b>Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill</b>	<b>Hazardous Waste Landfill</b>			
Total Organic Carbon (%)	0.10					3	5	6
Loss on Ignition (%)	2.6					-	-	10
Sum of BTEX (mg/kg)	<0.025					6	-	-
Sum of 7 PCBs (mg/kg)	<0.035					1	-	-
Mineral Oil (mg/kg)	<30					500	-	-
PAH Sum of 17(mg/kg)	<0.64					100	-	-
pH (pH Units)	11.21					-	>6	-
ANC to pH 7 (mol/kg)	0.30					-	to be evaluated	to be evaluated
ANC to pH 4 (mol/kg)	0.50					-	to be evaluated	to be evaluated
<b>Eluate Analysis</b>	<b>10:1 conc<sup>n</sup> leached</b>		<b>Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg</b>					
	<b>C<sub>10</sub></b>	<b>A<sub>10</sub></b>						
	<b>mg/l</b>	<b>mg/kg</b>	<b>mg/kg</b>					
Arsenic	<0.0025	<0.025	0.5	2	25			
Barium	0.050	0.50	20	100	300			
Cadmium	<0.0005	<0.005	0.04	1	5			
Chromium	0.0135	0.135	0.5	10	70			
Copper	<0.007	<0.07	2	50	100			
Mercury	<0.001	<0.01	0.01	0.2	2			
Molybdenum	0.002	<0.02	0.5	10	30			
Nickel	<0.002	<0.02	0.4	10	40			
Lead	<0.005	<0.05	0.5	10	50			
Antimony	<0.002	<0.02	0.06	0.7	5			
Selenium	<0.003	<0.03	0.1	0.5	7			
Zinc	<0.003	<0.03	4	50	200			
Chloride	6.4	64	800	15000	25000			
Fluoride	<0.3	<3	10	150	500			
Sulphate as SO4	22.55	225.5	1000	20000	50000			
Total Dissolved Solids	263	2630	4000	60000	100000			
Phenol	<0.01	<0.1	1	-	-			
Dissolved Organic Carbon	3	30	500	800	1000			

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

**Matrix : Solid**

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
16/15446	2	BH2	1.00	180-183	PAHs/tarmac-bitumen and possible lube oil
16/15446	2	WS7	0.70	200-203	PAHs/tarmac-bitumen and possible lube oil

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

**Note:**

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth  
 Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
16/15446	2	BH1	0.50	149	12/10/2016	<b>General Description (Bulk Analysis)</b>	Soil/Stones
					12/10/2016	<b>Asbestos Fibres</b>	NAD
					12/10/2016	<b>Asbestos Fibres (2)</b>	NAD
					12/10/2016	<b>Asbestos ACM</b>	NAD
					12/10/2016	<b>Asbestos ACM (2)</b>	NAD
					12/10/2016	<b>Asbestos Type</b>	NAD
					12/10/2016	<b>Asbestos Type (2)</b>	NAD
					12/10/2016	<b>Asbestos Level Screen</b>	NAD
16/15446	2	BH2	1.00	181	12/10/2016	<b>General Description (Bulk Analysis)</b>	Soil/Stones
					12/10/2016	<b>Asbestos Fibres</b>	Fibre Bundles
					12/10/2016	<b>Asbestos ACM</b>	NAD
					12/10/2016	<b>Asbestos Type</b>	Chrysotile
					12/10/2016	<b>Asbestos Level Screen</b>	<0.1%
					24/10/2016	<b>Asbestos Gravimetric Quantification</b>	<0.001 (mass %)
					24/10/2016	<b>Asbestos PCOM Quantification (Fibres)</b>	<0.001 (mass %)
24/10/2016	<b>Asbestos Gravimetric &amp; PCOM Total</b>	<0.001 (mass %)					





**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 16/15446						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.  
 Only analyses which are accredited are recorded as deviating if set criteria are not met.

# NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 16/15446

## SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

## WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

## DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

## SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

## DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

## NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

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

**ABBREVIATIONS and ACRONYMS USED**

#	ISO17025 (UKAS) accredited - UK.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of BTEX and calculation of Aliphatic fractions.	PM12/PM16	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis./Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of BTEX and calculation of Aliphatic fractions.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.			AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified USEPA 160.4. Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (450°C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM27	Modified US EPA method 9056. Determination of water soluble anions using Dionex (Ion-Chromatography).	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes		AR	Yes

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen and hydrazine. Samples are extracted using an orbital shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for anions. Extraction of as received samples with deionised water in a 2:1 water to solid ratio for ammoniacal nitrogen and hydrazine. Samples are extracted using an orbital shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes		AD	Yes
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO2 and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM61	As received solid samples are extracted with hot water in a 20:1 ratio of water to soil ready for analysis by ICP.			AR	Yes



JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM77	Modified DDCEN/TS method 15364:2006. Determination of Acid Neutralization Capacity by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	No
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	
TM15_A	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes



# Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point  
Zone 3  
Deeside Industrial Park  
Deeside  
CH5 2UA

Waterman Infrastructure & Environment Limited  
Pickfords Wharf  
Clink Street  
London  
SE1 9DG

Tel: +44 (0) 1244 833780  
Fax: +44 (0) 1244 833781



**Attention :** Robbie Moore  
**Date :** 10th November, 2016  
**Your reference :** 10667  
**Our reference :** Test Report 16/15446 Batch 5  
**Location :** Stag Brewery  
**Date samples received :** 29th October, 2016  
**Status :** Final report  
**Issue :** 1

Three samples were received for analysis on 29th October, 2016 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Compiled By:**

**Paul Lee-Boden BSc**  
**Project Manager**

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**Report : Liquid**

**Liquids/products:** V=40ml vial, G=glass bottle, P=plastic bottle  
H=H<sub>2</sub>SO<sub>4</sub>, Z=ZnAc, N=NaOH, HN=HNO<sub>3</sub>

J E Sample No.	247-251	252-256	257-261																	
Sample ID	BH1	BH2B	WS10																	
Depth																				
COC No / misc																				
Containers	V HN P G	V HN P G	V HN P G																	
Sample Date	27/10/2016 16:30	27/10/2016 16:30	27/10/2016 16:30																	
Sample Type	Ground Water	Ground Water	Ground Water																	
Batch Number	5	5	5																	
Date of Receipt	29/10/2016	29/10/2016	29/10/2016																	
Dissolved Calcium #	169.5	91.2	75.3																	
Dissolved Magnesium #	12.2	6.1	<0.1																	
Total Arsenic	68.7	86.2	407.5																	
Total Barium	250.0	114.8	949.7																	
Total Beryllium	5.4	2.1	18.8																	
Total Boron	282	81	<2																	
Total Cadmium	<0.03	<0.03	<0.03																	
Total Chromium	125.1	44.9	348.8																	
Total Cobalt	41.8	26.8	165.2																	
Total Copper	104	59	438																	
Total Iron	189900.0AA	103700.0AA	712700.0AB																	
Total Lead	68.8	34.3	324.3																	
Total Mercury	<0.5	<0.5	<0.5																	
Total Molybdenum	6.0	13.3	55.8																	
Total Nickel	237.5	107.8	525.7																	
Total Selenium	<1.2	<1.2	<1.2																	
Total Vanadium	201.8	76.5	606.9																	
Total Zinc	254.3	73.4	921.3																	
PAH MS																				
Naphthalene #	<0.1 <sup>B</sup>	0.1 <sup>B</sup>	<0.1 <sup>B</sup>																	
Acenaphthylene #	<0.013	<0.013	<0.013																	
Acenaphthene #	<0.013	<0.013	<0.013																	
Fluorene #	<0.014	<0.014	<0.014																	
Phenanthrene #	<0.011	<0.011	<0.011																	
Anthracene #	<0.013	<0.013	<0.013																	
Fluoranthene #	<0.012	<0.012	<0.012																	
Pyrene #	<0.013	<0.013	0.440																	
Benzo(a)anthracene #	<0.015	<0.015	0.040																	
Chrysene #	<0.011	<0.011	0.050																	
Benzo(bk)fluoranthene #	<0.018	<0.018	<0.018																	
Benzo(a)pyrene #	<0.016	<0.016	<0.016																	
Indeno(123cd)pyrene #	<0.011	<0.011	<0.011																	
Dibenzo(ah)anthracene #	<0.01	<0.01	<0.01																	
Benzo(ghi)perylene #	<0.011	<0.011	<0.011																	
PAH 16 Total #	<0.195	<0.195	0.530																	
Benzo(b)fluoranthene	<0.01	<0.01	<0.01																	
Benzo(k)fluoranthene	<0.01	<0.01	<0.01																	
PAH Surrogate % Recovery	80	80	86																	
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1																	
Benzene #	<0.5	<0.5	<0.5																	
Toluene #	<5	<5	<5																	
Ethylbenzene #	<0.5	<0.5	<0.5																	

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced

Client Name: Waterman Infrastructure & Environment Limited  
 Reference: 10667  
 Location: Stag Brewery  
 Contact: Robbie Moore  
 JE Job No.: 16/15446

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle  
 H=H<sub>2</sub>SO<sub>4</sub>, Z=ZnAc, N=NaOH, HN=HNO<sub>3</sub>

J E Sample No.	247-251	252-256	257-261																
	Sample ID	BH1	BH2B	WS10															
Depth																			
COC No / misc																			
Containers	V H N P G	V H N P G	V H N P G																
Sample Date	27/10/2016 16:30	27/10/2016 16:30	27/10/2016 16:30																
Sample Type	Ground Water	Ground Water	Ground Water																
Batch Number	5	5	5																
Date of Receipt	29/10/2016	29/10/2016	29/10/2016																
													LOD/LOR	Units	Method No.				
p/m-Xylene #	<1	<1	<1										<1	ug/l	TM15/PM10				
o-Xylene #	<0.5	<0.5	<0.5										<0.5	ug/l	TM15/PM10				
Surrogate Recovery Toluene D8	94	95	98										<0	%	TM15/PM10				
Surrogate Recovery 4-Bromofluorobenzene	101	101	100										<0	%	TM15/PM10				
TPH CWG																			
<b>Aliphatics</b>																			
>C5-C6 #	<5	<5	<5										<5	ug/l	TM36/PM12				
>C6-C8 #	<5	<5	<5										<5	ug/l	TM36/PM12				
>C8-C10 #	<5	<5	<5										<5	ug/l	TM36/PM12				
>C10-C12 #	<5	<5	<5										<5	ug/l	TM5/PM30				
>C12-C16 #	<10	<10	<10										<10	ug/l	TM5/PM30				
>C16-C21 #	<10	<10	<10										<10	ug/l	TM5/PM30				
>C21-C35 #	<10	<10	<10										<10	ug/l	TM5/PM30				
>C35-C44	<10	<10	<10										<10	ug/l	TM5/PM30				
Total aliphatics C5-44	<10	<10	<10										<10	ug/l	TM5/TM36/PM30				
<b>Aromatics</b>																			
>C5-EC7 #	<5	<5	<5										<5	ug/l	TM36/PM12				
>EC7-EC8 #	<5	<5	<5										<5	ug/l	TM36/PM12				
>EC8-EC10 #	<5	<5	<5										<5	ug/l	TM36/PM12				
>EC10-EC12 #	<5	<5	<5										<5	ug/l	TM5/PM30				
>EC12-EC16 #	<10	<10	<10										<10	ug/l	TM5/PM30				
>EC16-EC21 #	<10	<10	<10										<10	ug/l	TM5/PM30				
>EC21-EC35 #	<10	<10	<10										<10	ug/l	TM5/PM30				
>EC35-EC44	<10	<10	<10										<10	ug/l	TM5/PM30				
Total aromatics C5-44	<10	<10	<10										<10	ug/l	TM5/TM36/PM30				
Total aliphatics and aromatics(C5-44)	<10	<10	<10										<10	ug/l	TM5/TM36/PM30				
Hexavalent Chromium	<0.006	<0.006	0.034										<0.006	mg/l	TM38/PM0				

Please see attached notes for all abbreviations and acronyms



**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**VOC Report :** Liquid

J E Sample No.	247-251	252-256	257-261							Please see attached notes for all abbreviations and acronyms		
Sample ID	BH1	BH2B	WS10									
Depth												
COC No / misc Containers	V H N P G	V H N P G	V H N P G									
Sample Date	27/10/2016 16:30	27/10/2016 16:30	27/10/2016 16:30									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	5	5	5									
Date of Receipt	29/10/2016	29/10/2016	29/10/2016							LOD/LOR	Units	Method No.
VOC MS												
Dichlorodifluoromethane	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<3	<3	<3							<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
p/m-Xylene #	<1	<1	<1							<1	ug/l	TM15/PM10
o-Xylene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Styrene	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	94	95	98							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	101	101	100							<0	%	TM15/PM10



**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

**Matrix : Liquid**

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
16/15446	5					Liquid Samples were received at a temperature above 9°C.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.



# NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 16/15446

## SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

## WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

## DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

## SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

## DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

## NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

**ABBREVIATIONS and ACRONYMS USED**

#	ISO17025 (UKAS) accredited - UK.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x20 Dilution
AB	x100 Dilution

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of BTEX and calculation of Aliphatic fractions.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.				

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.				



# Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

Unit 3 Deeside Point  
Zone 3  
Deeside Industrial Park  
Deeside  
CH5 2UA

Waterman Infrastructure & Environment Limited  
Pickfords Wharf  
Clink Street  
London  
SE1 9DG

Tel: +44 (0) 1244 833780  
Fax: +44 (0) 1244 833781



**Attention :** Robbie Moore  
**Date :** 14th November, 2016  
**Your reference :** 10667  
**Our reference :** Test Report 16/15446 Batch 5 Schedule C  
**Location :** Stag Brewery  
**Date samples received :** 29th October, 2016  
**Status :** Final report  
**Issue :** 1

Three samples were received for analysis on 29th October, 2016 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Compiled By:**

**Simon Gomery BSc**  
**Project Manager**

*Exova Jones Environmental*

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore  
**JE Job No.:** 16/15446

**Report : Liquid**

**Liquids/products:** V=40ml vial, G=glass bottle, P=plastic bottle  
 H=H<sub>2</sub>SO<sub>4</sub>, Z=ZnAc, N=NaOH, HN=HNO<sub>3</sub>

J E Sample No.	247-251	252-256	257-261									LOD/LOR	Units	Method No.
<b>Sample ID</b>	BH1	BH2B	WS10											
<b>Depth</b>														
<b>COC No / misc</b>														
<b>Containers</b>	V HN P G	V HN P G	V HN P G											
<b>Sample Date</b>	27/10/2016 16:30	27/10/2016 16:30	27/10/2016 16:30											
<b>Sample Type</b>	Ground Water	Ground Water	Ground Water											
<b>Batch Number</b>	5	5	5											
<b>Date of Receipt</b>	29/10/2016	29/10/2016	29/10/2016											
Dissolved Calcium #	169.5	91.2	75.3									<0.2	mg/l	TM30/PM14
Dissolved Magnesium #	12.2	6.1	<0.1									<0.1	mg/l	TM30/PM14
Total Hardness Dissolved (as CaCO3)	475	254	188									<1	mg/l	TM30/PM14
pH #	6.78	7.43	11.60									<0.01	pH units	TM73/PM0

Please see attached notes for all abbreviations and acronyms

**Client Name:** Waterman Infrastructure & Environment Limited  
**Reference:** 10667  
**Location:** Stag Brewery  
**Contact:** Robbie Moore

**Matrix : Liquid**

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
16/15446	5					Liquid Samples were received at a temperature above 9°C.

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# NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 16/15446

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Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

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## DEVIATING SAMPLES

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## SURROGATES

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## DILUTIONS

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Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

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B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 16/15446

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			



## **Appendix G**

### **Waste Classification Process**

- **Regulatory Context**
- **HazWasteOnline™ Report**

## Regulatory Context

Waste management practices and requirements in the UK are largely driven by the European Waste Framework Directive<sup>1</sup>, which is implemented in the UK by a variety of regulatory instruments. A key component of the process is the need to determine the hazardous properties of a waste in accordance with the Hazardous Waste (England and Wales) Regulations 2005. The first step to deciding if a waste is hazardous or non-hazardous is by reference to the “European Waste Catalogue<sup>2</sup>, a comprehensive list of all wastes split into 20 chapters, which is predominantly based on industry practice (e.g. construction and demolition wastes), with some chapters based on materials and processes (e.g. oily wastes). Each waste is coded by a 6 digit code, where wastes are either classified as hazardous or non-hazardous. It should be noted that inert waste is a sub-set of non-hazardous waste.

Hazardous wastes are signified by entries where the code is followed by an asterisk, where some wastes are deemed hazardous without further assessment and which are termed “Absolute Entries” e.g. most waste oils. Alternatively waste entries are termed “Mirror” entries, these require further assessment of hazardous properties, in order to determine whether they are hazardous waste or not (e.g. soil and stones).

Excavation wastes (soils, made ground and similar) are coded by mirror entries:

- 17 05 03\* soil and stones containing hazardous substances; or
- 17 05 04 soil and stones other than those mentioned in 17 05 03

Therefore, soil and stones (or similar) can be either hazardous or non-hazardous waste, depending upon the concentrations of contaminants (e.g. diesel, asbestos, metals) in the waste. Other EWC codes may apply to excavation wastes containing asbestos and to road surfacing for example.

In order to determine if excavation waste is hazardous or not, the potential contaminants that may be present in the excavation wastes are identified based on the history of the waste (e.g. desk study of the source site for soils), with sufficient representative samples of the waste being subjected to appropriate laboratory chemical analysis. The data are compared to published thresholds, detailed in UK Environment Agencies guidance “WM3”<sup>3</sup>. Waterman chooses to use a commercially available tool referred to as HazWasteOnline™ to undertake the assessment. HazWasteOnline™ is web-based software which is regularly updated to reflect UK Environment Agencies guidance and European requirements. The system comprises an analysis and reporting web front-end and a calculation engine.

The hazard assessment does not define inert waste, nor does the hazard assessment confirm in the case of hazardous excavation waste whether or not the waste can be landfilled. Further Waste Acceptance Criteria (WAC)<sup>4</sup> testing is required in these instances, explained in further Environment Agency guidance, referred to herein as “EA WAC guidance”<sup>5</sup>. WAC testing is therefore used to determine possible off site landfill disposal options for these wastes.

WM3 also provides guidance to show how waste classification and assessment is applied to construction and demolition wastes containing asbestos<sup>6</sup> and waste containing coal tar<sup>7</sup>. The guidance is summarised below.

<sup>1</sup> Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives

<sup>2</sup> Commission Decision 2000/532/EC as amended comprising the European Waste Catalogue.

<sup>3</sup> Environment Agency Technical Guidance WM3 “Guidance on the classification and assessment of waste” (1st Edition 2015)” including additional guidance on sampling set out in Appendix D of this document

<sup>4</sup> Council Decision 2003/33/EC Establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of, and Annex II to, Directive 1999/31/EC

<sup>5</sup> Environment Agency “Waste Sampling and Testing for Disposal to Landfill” (March 2013)

<sup>6</sup> WM3 – Chapter 3, Section 1

<sup>7</sup> WM3 – Chapter 3, Section 2

### Construction and demolition wastes containing asbestos

The assessment of asbestos containing waste considers both the presence of asbestos as:

- Fibres that are free and dispersed, and
- Identifiable pieces of asbestos containing material.

If the waste contains fibres that are free and dispersed then the waste soil will be hazardous if the waste as a whole contains 0.1% or more asbestos.

If the waste contains any pieces of asbestos containing material that can be identified as potentially being asbestos containing materials by a competent person (if examined by the naked eye), then the pieces must be assessed separately. The waste is hazardous if the concentration of asbestos in the piece of asbestos containing material is 0.1% or more. The waste is regarded as a mixed waste and classified accordingly. The following codes should be assigned to the asbestos element of the waste as appropriate:

- 17 06 05\* Construction material containing asbestos
- 17 06 01\* Insulation material containing asbestos.

### Waste containing coal tar

The following applies only to Asphalt material classified in the List of Wastes as

- 17 03 01\* bituminous mixtures containing coal tar
- 17 03 02 bituminous mixtures other than those mentioned in 17 03 01

Where the concentration of benzo(a)pyrene is at or above 50mg/kg in the black top alone (excluding other material) then the amount of coal tar should be considered sufficient (0.1% or more) for material to be hazardous and thus coded 17 03 01\*. However, assessments based on PAH's alone are not consistent with the legislation and cannot be used to classify a waste as non-hazardous.

Any sampling of black top would need to ensure that layers with different concentrations of benzo(a)pyrene are identified and sampled.

If waste is found to be hazardous, the consignment note process set out in the Hazardous Waste (England and Wales) Regulations 2005 must be complied with. If waste is found to be non-hazardous the requirements of the "duty of care" set out in section 34 Environmental Protection Act 1990 and in the Waste (England and Wales) Regulations 2011 (content of the transfer note) must be complied with.

### Options Assessment

Following the classification of excavation wastes, the options available for the waste can be considered in the context of the waste hierarchy:

- on-site reuse (with or without prior treatment);
- off-site reuse (with or without prior treatment) e.g. use of waste in construction;
- off-site processing for recycling or recovery e.g. screening; and
- off-site disposal (with or without prior treatment) i.e. landfill.

The storage, treatment and use of waste are subject to waste regulatory controls including authorisations issued by the UK Environment Agencies.

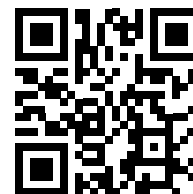
### Interpretation of Laboratory Analysis Data

WM3 sets out the circumstances in which data can be subject to statistical analysis<sup>8</sup>. A sampling plan prepared in accordance with relevant standards should be implemented to recover the samples for laboratory analysis. These methods can permit the exclusion of data points in excess of hazardous waste thresholds or in excess of WAC thresholds.

It should be noted that these means of assessing the data need to be acceptable to a receiving Site.

<sup>8</sup> WM3 Appendix D

# Waste Classification Report



LQ4HG-F7NSS-QM37B

## Job name

WIE10667-101 Stag Brewery East Site. Alluvium

## Waste Stream

Soil - Hazwaste Template v2.5 (WM3 1st ed)

## Comments

Preliminary Waste Assessment of laboratory analysis results for soil samples taken as part of a contaminated land site investigation at Stag Brewery East Site. The soil samples taken were collected as discreet samples for contaminated land assessment purposes and have not been sampled in strict accordance with the guidelines presented in EA document Waste Classification: Guidance on the classification and assessment of waste (1st edition 2015) Technical Guidance WM3. This waste assessment should be regarded as preliminary, and indicative only of like costs for construction.

## Project

WIE10667-101 Stag Brewery East Site. Site Investigation.

## Site

Stag Brewery East Site, Mortlake, London.

## Classified by

Name:

**Coates, Jon**

Date:

**17/11/2016 19:44 UTC**

Telephone:

**020 7928 7888**

Company:

**Waterman Energy Environment & Design Ltd**

**Pickfords Wharf**

**Clink Street**

**London**

**SE1 9DG**

## Report

Created by: Coates, Jon

Created date: 17/11/2016 19:44 UTC

## Job summary

#	Sample Name	Depth [m]	Classification Result	Hazardous properties	Page
1	WS9A	2.5	Non Hazardous		2

## Appendices

	Page
Appendix A: Classifier defined and non CLP determinands	4
Appendix B: Rationale for selection of metal species	6
Appendix C: Version	6

Classification of sample: WS9A

✔ **Non Hazardous Waste**  
Classified as **17 05 04**  
in the List of Waste

Sample details

Sample Name:	LoW Code:
<b>WS9A</b>	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
<b>2.5 m</b>	
Moisture content: <b>6%</b> (dry weight correction)	

Hazard properties

None identified

Determinands (Moisture content: 6%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 11.9 mg/kg, converted to compound conc.:14.823 mg/kg or 0.00148%)  
barium sulfate: (Cation conc. entered: 13 mg/kg, converted to compound conc.:20.843 mg/kg or 0.00208%)  
beryllium oxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<1.309 mg/kg or <0.000131%)  
**IGNORED Because: "<LOD"**  
diboron trioxide; boric oxide: (Cation conc. entered: 0.1 mg/kg, converted to compound conc.:0.304 mg/kg or 0.0000304%)  
cadmium oxide: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.108 mg/kg or <0.0000108%)  
**IGNORED Because: "<LOD"**  
chromium(III) oxide: (Cation conc. entered: 90.8 mg/kg, converted to compound conc.:125.197 mg/kg or 0.0125%)  
chromium(VI) oxide: (Cation conc. entered: <0.3 mg/kg, converted to compound conc.:<0.544 mg/kg or <0.0000544%)  
**IGNORED Because: "<LOD"**  
cobalt sulfate: (Cation conc. entered: 3.3 mg/kg, converted to compound conc.:8.188 mg/kg or 0.000819%, Note 1 conc.: 0.000311%)  
copper sulphate: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.37 mg/kg or <0.000237%)  
**IGNORED Because: "<LOD"**  
lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: <5 mg/kg, converted to compound conc.:<4.717 mg/kg or <0.000472%, Note 1 conc.: <0.000472%) **IGNORED Because: "<LOD"**  
mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.128 mg/kg or <0.0000128%)  
**IGNORED Because: "<LOD"**  
molybdenum(VI) oxide: (Cation conc. entered: 3.2 mg/kg, converted to compound conc.:4.529 mg/kg or 0.000453%)  
nickel(II) oxide (nickel monoxide): (Cation conc. entered: 13.5 mg/kg, converted to compound conc.:16.208 mg/kg or 0.00162%)  
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.409 mg/kg or <0.000241%) **IGNORED Because: "<LOD"**  
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 22 mg/kg, converted to compound conc.:37.051 mg/kg or 0.00371%)  
zinc oxide: (Cation conc. entered: 15 mg/kg, converted to compound conc.:17.614 mg/kg or 0.00176%)  
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <52 mg/kg or <0.00491%) **IGNORED Because: "<LOD"**  
benzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000472%) **IGNORED Because: "<LOD"**  
toluene: (Whole conc. entered as: <0.005 mg/kg or <0.000000472%) **IGNORED Because: "<LOD"**  
ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000472%) **IGNORED Because: "<LOD"**  
xylylene: (Whole conc. entered as: <0.005 mg/kg or <0.000000472%) **IGNORED Because: "<LOD"**  
naphthalene: (Whole conc. entered as: <0.04 mg/kg or <0.00000377%) **IGNORED Because: "<LOD"**  
acenaphthylene: (Whole conc. entered as: <0.03 mg/kg or <0.00000283%) **IGNORED Because: "<LOD"**  
acenaphthene: (Whole conc. entered as: <0.05 mg/kg or <0.00000472%) **IGNORED Because: "<LOD"**



fluorene: (Whole conc. entered as: <0.04 mg/kg or <0.00000377%) **IGNORED Because: "<LOD"**  
 phenanthrene: (Whole conc. entered as: <0.03 mg/kg or <0.00000283%) **IGNORED Because: "<LOD"**  
 anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.00000377%) **IGNORED Because: "<LOD"**  
 fluoranthene: (Whole conc. entered as: <0.03 mg/kg or <0.00000283%) **IGNORED Because: "<LOD"**  
 pyrene: (Whole conc. entered as: <0.03 mg/kg or <0.00000283%) **IGNORED Because: "<LOD"**  
 benzo[a]anthracene: (Whole conc. entered as: <0.06 mg/kg or <0.00000566%) **IGNORED Because: "<LOD"**  
 chrysene: (Whole conc. entered as: <0.02 mg/kg or <0.00000189%) **IGNORED Because: "<LOD"**  
 benzo[b]fluoranthene: (Whole conc. entered as: <0.05 mg/kg or <0.00000472%) **IGNORED Because: "<LOD"**  
 benzo[k]fluoranthene: (Whole conc. entered as: <0.02 mg/kg or <0.00000189%) **IGNORED Because: "<LOD"**  
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.04 mg/kg or <0.00000377%) **IGNORED Because: "<LOD"**  
 indeno[123-cd]pyrene: (Whole conc. entered as: <0.04 mg/kg or <0.00000377%) **IGNORED Because: "<LOD"**  
 dibenz[a,h]anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.00000377%) **IGNORED Because: "<LOD"**  
 benzo[ghi]perylene: (Whole conc. entered as: <0.04 mg/kg or <0.00000377%) **IGNORED Because: "<LOD"**  
 phenol: (Whole conc. entered as: <0.01 mg/kg or <0.000000943%) **IGNORED Because: "<LOD"**  
 1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**  
 1,1,2-trichloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**  
 1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.000000566%) **IGNORED Because: "<LOD"**  
 1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.000000566%) **IGNORED Because: "<LOD"**  
 bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <0.1 mg/kg or <0.000000943%) **IGNORED Because: "<LOD"**  
 bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.000000189%) **IGNORED Because: "<LOD"**  
 bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**  
 carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.000000377%) **IGNORED Because: "<LOD"**  
 styrene: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**  
 trichloroethene (TCE): (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**  
 chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentaoxide; vanadium pentoxide"

**Note 1** , used on:

Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"  
 Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "cobalt sulfate"  
 Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD" for determinand: "cobalt sulfate"  
 Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"  
 Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

## Determinand notes

**Note 1** , used on:

determinand: "cobalt sulfate"

---

## Appendix A: Classifier defined and non CLP determinands

---

### **barium sulfate** (CAS Number: 7727-43-7)

---

Conversion factor: 1.7

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R20/22, R33, R36/37/38

Hazard Statements: Acute Tox. 4; H332, Acute Tox. 4; H302, STOT RE 2; H373, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315

### **chromium(III) oxide** (CAS Number: 1308-38-9)

---

Conversion factor: 1.462

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R20, R22, R36, R37, R38, R42, R43, R50/53, R60, R61

Hazard Statements: Acute Tox. 4; H332, Acute Tox. 4; H302, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Resp. Sens. 1; H334, Skin Sens. 1; H317, Repr. 1B; H360FD, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

### **lead compounds with the exception of those specified elsewhere in this Annex**

---

CLP index number: 082-001-00-6

Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)

Additional Risk Phrases: None.

Additional Hazard Statement(s): Carc. 2; H351

Reason:

03/06/2015 - Carc. 2; H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium [www.reach-lead.eu/substanceinformation.html](http://www.reach-lead.eu/substanceinformation.html). Review date 29/09/2015

### **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

---

Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013

Data source: WM3 1st Edition 2015

Data source date: 25/05/2015

Risk Phrases: R10, R45, R46, R51/53, R63, R65

Hazard Statements: Flam. Liq. 3; H226, Asp. Tox. 1; H304, STOT RE 2; H373, Muta. 1B; H340, Carc. 1B; H350, Repr. 2; H361d, Aquatic Chronic 2; H411

### **ethylbenzene** (CAS Number: 100-41-4)

---

CLP index number: 601-023-00-4

Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)

Additional Risk Phrases: None.

Additional Hazard Statement(s): Carc. 2; H351

Reason:

03/06/2015 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

### **acenaphthylene** (CAS Number: 208-96-8)

---

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R22, R26, R27, R36, R37, R38

Hazard Statements: Acute Tox. 4; H302, Acute Tox. 1; H330, Acute Tox. 1; H310, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315

### **acenaphthene** (CAS Number: 83-32-9)

---

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R36, R37, R38, N; R50/53, N; R51/53

Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Aquatic Chronic 2; H411

---

**fluorene** (CAS Number: 86-73-7)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: N; R50/53

Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

---

**phenanthrene** (CAS Number: 85-01-8)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: R22, R36, R37, R38, R40, R43, N; R50/53

Hazard Statements: Acute Tox. 4; H302, Eye Irrit. 2; H319, STOT SE 3; H335, Carc. 2; H351, Skin Sens. 1; H317, Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Skin Irrit. 2; H315

---

**anthracene** (CAS Number: 120-12-7)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R36, R37, R38, R43, N; R50/53

Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Skin Sens. 1; H317, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

---

**fluoranthene** (CAS Number: 206-44-0)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21/08/2015

Risk Phrases: Xn; R22, N; R50/53

Hazard Statements: Acute Tox. 4; H302, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

---

**pyrene** (CAS Number: 129-00-0)

Comments: Data from C&amp;L Inventory Database; SDS Sigma Aldrich 2014

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21/08/2015

Risk Phrases: Xi; R36/37/38, N; R50/53

Hazard Statements: Skin Irrit. 2; H315, Eye Irrit. 2; H319, STOT SE 3; H335, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

---

**indeno[123-cd]pyrene** (CAS Number: 193-39-5)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: R40

Hazard Statements: Carc. 2; H351

---

**benzo[ghi]perylene** (CAS Number: 191-24-2)

Comments: Data from C&amp;L Inventory Database; SDS Sigma Aldrich 28/02/2015

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 23/07/2015

Risk Phrases: N; R50/53

Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

---

**chlorobenzene** (CAS Number: 108-90-7)

CLP index number: 602-033-00-1

Data source: Regulation (EU) 2016/1179 of 19 July 2016 (ATP9)

Additional Risk Phrases: N; R51/53

Additional Hazard Statement(s): None.

Reason:

10/10/2016 - N; R51/53 hazard statement sourced from: WM3 v1 still uses ecotoxic risk phrases

---

## Appendix B: Rationale for selection of metal species

---

### C14: Step 5

from section: WM3: C14 in the document: "[WM3 - Waste Classification](#)"

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..."

### Note 1

from section: 1.1.3.2, Annex VI in the document: "[CLP Regulation](#)"

"The concentration stated or, in the absence of such concentrations, the generic concentrations of this Regulation (Table 3.1) or the generic concentrations of Directive 1999/45/EC (Table 3.2), are the percentages by weight of the metallic element calculated with reference to the total weight of the mixture."

---

## Appendix C: Version

---

This classification utilises the following guidance and legislation:

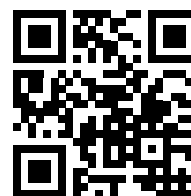
- WM3 - Waste Classification - May 2015
- CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
- 1st ATP - Regulation 790/2009/EC of 10 August 2009
- 2nd ATP - Regulation 286/2011/EC of 10 March 2011
- 3rd ATP - Regulation 618/2012/EU of 10 July 2012
- 4th ATP - Regulation 487/2013/EU of 8 May 2013
- Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
- 5th ATP - Regulation 944/2013/EU of 2 October 2013
- 6th ATP - Regulation 605/2014/EU of 5 June 2014
- WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
- Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
- 7th ATP - Regulation 2015/1221/EU of 24 July 2015
- 8th ATP - Regulation (EU) 2016/918 of 19 May 2016
- 9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
- POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
- 1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
- 2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

HazWasteOnline Classification Engine: WM3 1st Edition, May 2015

HazWasteOnline Classification Engine Version: 2016.317.3166.6295 (12 Nov 2016)

HazWasteOnline Database: 2016.315.3165.6292 (10 Nov 2016)

# Waste Classification Report



CDBXC-4B9VQ-SX2HT

## Job name

WIE10667-101 Stag Brewery East Site. Kempton Park Gravel.

## Waste Stream

Soil - Hazwaste Template v2.5 (WM3 1st ed)

## Comments

Preliminary Waste Assessment of laboratory analysis results for soil samples taken as part of a contaminated land site investigation at Stag Brewery East Site. The soil samples taken were collected as discreet samples for contaminated land assessment purposes and have not been sampled in strict accordance with the guidelines presented in EA document Waste Classification: Guidance on the classification and assessment of waste (1st edition 2015) Technical Guidance WM3. This waste assessment should be regarded as preliminary, and indicative only of like costs for construction.

## Project

WIE10667-101 Stag Brewery East Site. Site Investigation.

## Site

Stag Brewery East Site, Mortlake, London.

## Classified by

Name:  
**Coates, Jon**  
Date:  
**17/11/2016 19:44 UTC**  
Telephone:  
**020 7928 7888**

Company:  
**Waterman Energy Environment & Design Ltd**  
**Pickfords Wharf**  
**Clink Street**  
**London**  
**SE1 9DG**

## Report


Created by: Coates, Jon  
Created date: 17/11/2016 19:44 UTC

## Job summary

#	Sample Name	Depth [m]	Classification Result	Hazardous properties	Page
1	WS10A	3	Non Hazardous		2

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## Classification of sample: WS10A

 **Non Hazardous Waste**  
Classified as **17 05 04**  
in the List of Waste

## Sample details

Sample Name:	LoW Code:
<b>WS10A</b>	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
<b>3 m</b>	
Moisture content: <b>9.3%</b> (dry weight correction)	

## Hazard properties

None identified

## Determinands (Moisture content: 9.3%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 27 mg/kg, converted to compound conc.:32.616 mg/kg or 0.00326%)  
barium sulfate: (Cation conc. entered: 22 mg/kg, converted to compound conc.:34.208 mg/kg or 0.00342%)  
beryllium oxide: (Cation conc. entered: 0.8 mg/kg, converted to compound conc.:2.031 mg/kg or 0.000203%)  
diboron trioxide; boric oxide: (Cation conc. entered: 0.4 mg/kg, converted to compound conc.:1.178 mg/kg or 0.000118%)  
cadmium oxide: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.105 mg/kg or <0.0000105%)  
**IGNORED Because: "<LOD"**  
chromium(III) oxide: (Cation conc. entered: 88.4 mg/kg, converted to compound conc.:118.208 mg/kg or 0.0118%)  
chromium(VI) oxide: (Cation conc. entered: <0.3 mg/kg, converted to compound conc.:<0.528 mg/kg or <0.0000528%)  
**IGNORED Because: "<LOD"**  
cobalt sulfate: (Cation conc. entered: 7.2 mg/kg, converted to compound conc.:17.325 mg/kg or 0.00173%, Note 1 conc.: 0.000659%)  
copper sulphate: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.298 mg/kg or <0.00023%)  
**IGNORED Because: "<LOD"**  
lead chromate: (Cation conc. entered: 11 mg/kg, converted to compound conc.:15.698 mg/kg or 0.00157%, Note 1 conc.: 0.00101%)  
mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.124 mg/kg or <0.0000124%)  
**IGNORED Because: "<LOD"**  
molybdenum(VI) oxide: (Cation conc. entered: 3.3 mg/kg, converted to compound conc.:4.529 mg/kg or 0.000453%)  
nickel(II) oxide (nickel monoxide): (Cation conc. entered: 25 mg/kg, converted to compound conc.:29.108 mg/kg or 0.00291%)  
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.336 mg/kg or <0.000234%) **IGNORED Because: "<LOD"**  
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 42 mg/kg, converted to compound conc.:68.598 mg/kg or 0.00686%)  
zinc oxide: (Cation conc. entered: 33 mg/kg, converted to compound conc.:37.581 mg/kg or 0.00376%)  
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <52 mg/kg or <0.00476%) **IGNORED Because: "<LOD"**  
benzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000457%) **IGNORED Because: "<LOD"**  
toluene: (Whole conc. entered as: <0.005 mg/kg or <0.000000457%) **IGNORED Because: "<LOD"**  
ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000457%) **IGNORED Because: "<LOD"**  
xylene: (Whole conc. entered as: <0.005 mg/kg or <0.000000457%) **IGNORED Because: "<LOD"**  
naphthalene: (Whole conc. entered as: <0.04 mg/kg or <0.00000366%) **IGNORED Because: "<LOD"**  
acenaphthylene: (Whole conc. entered as: <0.03 mg/kg or <0.00000274%) **IGNORED Because: "<LOD"**  
acenaphthene: (Whole conc. entered as: <0.05 mg/kg or <0.00000457%) **IGNORED Because: "<LOD"**  
fluorene: (Whole conc. entered as: <0.04 mg/kg or <0.00000366%) **IGNORED Because: "<LOD"**  
phenanthrene: (Whole conc. entered as: 0.03 mg/kg or 0.00000274%)

anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.00000366%) **IGNORED Because: "<LOD"**  
 fluoranthene: (Whole conc. entered as: 0.07 mg/kg or 0.0000064%)  
 pyrene: (Whole conc. entered as: 0.07 mg/kg or 0.0000064%)  
 benzo[a]anthracene: (Whole conc. entered as: 0.08 mg/kg or 0.00000732%)  
 chrysene: (Whole conc. entered as: 0.07 mg/kg or 0.0000064%)  
 benzo[b]fluoranthene: (Whole conc. entered as: 0.08 mg/kg or 0.00000732%)  
 benzo[k]fluoranthene: (Whole conc. entered as: 0.03 mg/kg or 0.00000274%)  
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.05 mg/kg or 0.00000457%)  
 indeno[123-cd]pyrene: (Whole conc. entered as: 0.05 mg/kg or 0.00000457%)  
 dibenz[a,h]anthracene: (Whole conc. entered as: 0.08 mg/kg or 0.00000732%)  
 benzo[ghi]perylene: (Whole conc. entered as: 0.04 mg/kg or 0.00000366%)  
 phenol: (Whole conc. entered as: <0.01 mg/kg or <0.00000915%) **IGNORED Because: "<LOD"**  
 1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.00000274%) **IGNORED Because: "<LOD"**  
 1,1,2-trichloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.00000274%) **IGNORED Because: "<LOD"**  
 1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.00000549%) **IGNORED Because: "<LOD"**  
 1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.00000549%) **IGNORED Because: "<LOD"**  
 bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <0.1 mg/kg or <0.00000915%) **IGNORED Because: "<LOD"**  
 bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.00000183%) **IGNORED Because: "<LOD"**  
 bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.00000274%) **IGNORED Because: "<LOD"**  
 carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.00000366%) **IGNORED Because: "<LOD"**  
 styrene: (Whole conc. entered as: <0.003 mg/kg or <0.00000274%) **IGNORED Because: "<LOD"**  
 trichloroethene (TCE): (Whole conc. entered as: <0.003 mg/kg or <0.00000274%) **IGNORED Because: "<LOD"**  
 chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.00000274%) **IGNORED Because: "<LOD"**

## Notes utilised in assessment

### C14: Step 5

"Identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead chromate"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "phenanthrene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluoranthene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "pyrene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]anthracene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chrysene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[b]fluoranthene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[k]fluoranthene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "dibenz[a,h]anthracene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[ghi]perylene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentaoxide; vanadium pentoxide"

**Note 1** , used on:

Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead chromate"  
 Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"  
 Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "lead chromate"  
 Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD" for determinand: "cobalt sulfate"  
 Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"  
 Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"

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Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

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### Determinand notes

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**Note 1** , used on:

determinand: "cobalt sulfate"  
determinand: "lead chromate"



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**Appendix A: Classifier defined and non CLP determinands**

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**barium sulfate** (CAS Number: 7727-43-7)

Conversion factor: 1.7

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R20/22, R33, R36/37/38

Hazard Statements: Acute Tox. 4; H332, Acute Tox. 4; H302, STOT RE 2; H373, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315

**chromium(III) oxide** (CAS Number: 1308-38-9)

Conversion factor: 1.462

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R20, R22, R36, R37, R38, R42, R43, R50/53, R60, R61

Hazard Statements: Acute Tox. 4; H332, Acute Tox. 4; H302, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Resp. Sens. 1; H334, Skin Sens. 1; H317, Repr. 1B; H360FD, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

**TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013

Data source: WM3 1st Edition 2015

Data source date: 25/05/2015

Risk Phrases: R10, R45, R46, R51/53, R63, R65

Hazard Statements: Flam. Liq. 3; H226, Asp. Tox. 1; H304, STOT RE 2; H373, Muta. 1B; H340, Carc. 1B; H350, Repr. 2; H361d, Aquatic Chronic 2; H411

**ethylbenzene** (CAS Number: 100-41-4)

CLP index number: 601-023-00-4

Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)

Additional Risk Phrases: None.

Additional Hazard Statement(s): Carc. 2; H351

Reason:

03/06/2015 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

**acenaphthylene** (CAS Number: 208-96-8)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R22, R26, R27, R36, R37, R38

Hazard Statements: Acute Tox. 4; H302, Acute Tox. 1; H330, Acute Tox. 1; H310, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315

**acenaphthene** (CAS Number: 83-32-9)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R36, R37, R38, N; R50/53, N; R51/53

Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Aquatic Chronic 2; H411

**fluorene** (CAS Number: 86-73-7)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: N; R50/53

Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

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**phenanthrene** (CAS Number: 85-01-8)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: R22, R36, R37, R38, R40, R43, N; R50/53

Hazard Statements: Acute Tox. 4; H302, Eye Irrit. 2; H319, STOT SE 3; H335, Carc. 2; H351, Skin Sens. 1; H317,

Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Skin Irrit. 2; H315

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**anthracene** (CAS Number: 120-12-7)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R36, R37, R38, R43, N; R50/53

Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Skin Sens. 1; H317, Aquatic Acute 1; H400,

Aquatic Chronic 1; H410

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**fluoranthene** (CAS Number: 206-44-0)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21/08/2015

Risk Phrases: Xn; R22, N; R50/53

Hazard Statements: Acute Tox. 4; H302, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

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**pyrene** (CAS Number: 129-00-0)

Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21/08/2015

Risk Phrases: Xi; R36/37/38, N; R50/53

Hazard Statements: Skin Irrit. 2; H315, Eye Irrit. 2; H319, STOT SE 3; H335, Aquatic Acute 1; H400, Aquatic Chronic 1;

H410

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**indeno[123-cd]pyrene** (CAS Number: 193-39-5)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: R40

Hazard Statements: Carc. 2; H351

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**benzo[ghi]perylene** (CAS Number: 191-24-2)

Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 23/07/2015

Risk Phrases: N; R50/53

Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

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**chlorobenzene** (CAS Number: 108-90-7)

CLP index number: 602-033-00-1

Data source: Regulation (EU) 2016/1179 of 19 July 2016 (ATP9)

Additional Risk Phrases: N; R51/53

Additional Hazard Statement(s): None.

Reason:

10/10/2016 - N; R51/53 hazard statement sourced from: WM3 v1 still uses ecotoxic risk phrases

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**Appendix B: Rationale for selection of metal species**

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**C14: Step 5**

from section: WM3: C14 in the document: "[WM3 - Waste Classification](#)"

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..."

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**Note 1**

from section: 1.1.3.2, Annex VI in the document: "[CLP Regulation](#)"

"The concentration stated or, in the absence of such concentrations, the generic concentrations of this Regulation (Table 3.1) or the generic concentrations of Directive 1999/45/EC (Table 3.2), are the percentages by weight of the metallic element calculated with reference to the total weight of the mixture."

## Appendix C: Version

This classification utilises the following guidance and legislation:

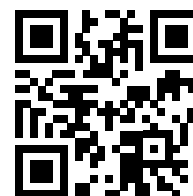
- WM3 - Waste Classification - May 2015
- CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
- 1st ATP - Regulation 790/2009/EC of 10 August 2009
- 2nd ATP - Regulation 286/2011/EC of 10 March 2011
- 3rd ATP - Regulation 618/2012/EU of 10 July 2012
- 4th ATP - Regulation 487/2013/EU of 8 May 2013
- Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
- 5th ATP - Regulation 944/2013/EU of 2 October 2013
- 6th ATP - Regulation 605/2014/EU of 5 June 2014
- WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
- Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
- 7th ATP - Regulation 2015/1221/EU of 24 July 2015
- 8th ATP - Regulation (EU) 2016/918 of 19 May 2016
- 9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
- POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
- 1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
- 2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

HazWasteOnline Classification Engine: WM3 1st Edition, May 2015

HazWasteOnline Classification Engine Version: 2016.317.3166.6295 (12 Nov 2016)

HazWasteOnline Database: 2016.315.3165.6292 (10 Nov 2016)

# Waste Classification Report



MTU6X-UELWP-J56CT

## Job name

WIE10667-101 Stag Brewery East Site. Made Ground

## Waste Stream

Soil - Hazwaste Template v2.5 (WM3 1st ed)

## Comments

Preliminary Waste Assessment of laboratory analysis results for soil samples taken as part of a contaminated land site investigation at Stag Brewery East Site. The soil samples taken were collected as discreet samples for contaminated land assessment purposes and have not been sampled in strict accordance with the guidelines presented in EA document Waste Classification: Guidance on the classification and assessment of waste (1st edition 2015) Technical Guidance WM3. This waste assessment should be regarded as preliminary, and indicative only of like costs for construction.

## Project

WIE10667-101 Stag Brewery East Site. Site Investigation.

## Site

Stag Brewery East Site, Mortlake, London.

## Classified by

Name:  
**Coates, Jon**  
Date:  
**17/11/2016 19:42 UTC**  
Telephone:  
**020 7928 7888**

Company:  
**Waterman Energy Environment & Design Ltd**  
**Pickfords Wharf**  
**Clink Street**  
**London**  
**SE1 9DG**

## Report

Created by: Coates, Jon  
Created date: 17/11/2016 19:42 UTC

## Job summary

#	Sample Name	Depth [m]	Classification Result	Hazardous properties	Page
1	WS1	0.5	Non Hazardous		3
2	WS2	1.5	Non Hazardous		6
3	WS3	0.5	Non Hazardous		9
4	WS4	0.5	Hazardous	HP 7, HP 11	12
5	WS5	1	Hazardous	HP 7, HP 11	15
6	WS7	0.7	Non Hazardous		18
7	WS8	1	Non Hazardous		21
8	WS10	1	Non Hazardous		23
9	WS11	0.5	Hazardous	HP 7, HP 11	26
10	BH1	0.5	Non Hazardous		29
11	BH2A	1	Non Hazardous		32

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**Classification of sample: WS1**

✔ **Non Hazardous Waste**  
Classified as **17 05 04**  
in the List of Waste

**Sample details**

<p>Sample Name: <b>WS1</b></p> <p>Sample Depth: <b>0.5 m</b></p> <p>Moisture content: <b>0%</b> (dry weight correction)</p>	<p>LoW Code: Chapter:      <b>17: Construction and Demolition Wastes (including excavated soil from contaminated sites)</b></p> <p>Entry:        <b>17 05 04 (Soil and stones other than those mentioned in 17 05 03)</b></p>
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**Hazard properties**

None identified

**Determinands** (Moisture content: 0%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 12.8 mg/kg, converted to compound conc.:16.9 mg/kg or 0.00169%)  
barium sulfate: (Cation conc. entered: 60 mg/kg, converted to compound conc.:101.971 mg/kg or 0.0102%)  
beryllium oxide: (Cation conc. entered: 0.7 mg/kg, converted to compound conc.:1.943 mg/kg or 0.000194%)  
diboron trioxide; boric oxide: (Cation conc. entered: 0.7 mg/kg, converted to compound conc.:2.254 mg/kg or 0.000225%)  
cadmium oxide: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.114 mg/kg or <0.0000114%)  
**IGNORED Because: "<LOD"**  
chromium(III) oxide: (Cation conc. entered: 20.4 mg/kg, converted to compound conc.:29.816 mg/kg or 0.00298%)  
chromium(VI) oxide: (Cation conc. entered: <0.3 mg/kg, converted to compound conc.:<0.577 mg/kg or <0.0000577%)  
**IGNORED Because: "<LOD"**  
cobalt sulfate: (Cation conc. entered: 7.2 mg/kg, converted to compound conc.:18.936 mg/kg or 0.00189%, Note 1 conc.: 0.00072%)  
copper sulphate: (Cation conc. entered: 14 mg/kg, converted to compound conc.:35.164 mg/kg or 0.00352%)  
lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: 63 mg/kg, converted to compound conc.:63 mg/kg or 0.0063%, Note 1 conc.: 0.0063%)  
mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.135 mg/kg or <0.0000135%)  
**IGNORED Because: "<LOD"**  
molybdenum(VI) oxide: (Cation conc. entered: 0.5 mg/kg, converted to compound conc.:0.75 mg/kg or 0.000075%)  
nickel(II) oxide (nickel monoxide): (Cation conc. entered: 17.5 mg/kg, converted to compound conc.:22.27 mg/kg or 0.00223%)  
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.554 mg/kg or <0.000255%) **IGNORED Because: "<LOD"**  
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 38 mg/kg, converted to compound conc.:67.837 mg/kg or 0.00678%)  
zinc oxide: (Cation conc. entered: 37 mg/kg, converted to compound conc.:46.054 mg/kg or 0.00461%)  
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <52 mg/kg or <0.0052%) **IGNORED Because: "<LOD"**  
benzene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
toluene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
xylene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
naphthalene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
acenaphthylene: (Whole conc. entered as: 0.03 mg/kg or 0.000003%)  
acenaphthene: (Whole conc. entered as: <0.05 mg/kg or <0.000005%) **IGNORED Because: "<LOD"**  
fluorene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
phenanthrene: (Whole conc. entered as: 0.23 mg/kg or 0.000023%)  
anthracene: (Whole conc. entered as: 0.06 mg/kg or 0.000006%)

fluoranthene: (Whole conc. entered as: 0.44 mg/kg or 0.000044%)  
pyrene: (Whole conc. entered as: 0.35 mg/kg or 0.000035%)  
benzo[a]anthracene: (Whole conc. entered as: 0.3 mg/kg or 0.00003%)  
chrysene: (Whole conc. entered as: 0.23 mg/kg or 0.000023%)  
benzo[b]fluoranthene: (Whole conc. entered as: 0.34 mg/kg or 0.000034%)  
benzo[k]fluoranthene: (Whole conc. entered as: 0.34 mg/kg or 0.000034%)  
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.21 mg/kg or 0.000021%)  
indeno[123-cd]pyrene: (Whole conc. entered as: 0.14 mg/kg or 0.000014%)  
dibenz[a,h]anthracene: (Whole conc. entered as: 0.04 mg/kg or 0.000004%)  
benzo[ghi]perylene: (Whole conc. entered as: 0.12 mg/kg or 0.000012%)  
phenol: (Whole conc. entered as: <0.01 mg/kg or <0.000001%) **IGNORED Because: "<LOD"**  
1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
1,1,2-trichloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.0000006%) **IGNORED Because: "<LOD"**  
1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.0000006%) **IGNORED Because: "<LOD"**  
bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**  
bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.0000002%) **IGNORED Because: "<LOD"**  
bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.0000004%) **IGNORED Because: "<LOD"**  
styrene: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
trichloroethene (TCE): (Whole conc. entered as: 0.006 mg/kg or 0.0000006%)  
polychlorobiphenyls; PCB: (Whole conc. entered as: <0.035 mg/kg or <0.0000035%) **IGNORED Because: "<LOD"**  
vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.0000002%) **IGNORED Because: "<LOD"**  
chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "copper sulphate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "phenanthrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "pyrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[b]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[k]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "dibenz[a,h]anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[ghi]perylene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentoxide; vanadium pentoxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "trichloroethene (TCE)"

**Note 1** , used on:

Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"

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Test: "HP 6 on Acute Tox. 4; H332" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "cobalt sulfate"

Test: "HP 7 on Carc. 2; H351" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD" for determinand: "cobalt sulfate"

Test: "HP 10 on Repr. 2; H361, Repr. 2; H361d, Repr. 2; H361f, Repr. 2; H361fd" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"

Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

## Determinand notes

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**Note 1** , used on:

determinand: "cobalt sulfate"

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**Note A** , used on:

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"



## Classification of sample: WS2

✔ **Non Hazardous Waste**  
Classified as **17 05 04**  
in the List of Waste

## Sample details

Sample Name:	LoW Code:
<b>WS2</b>	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
<b>1.5 m</b>	
Moisture content: <b>18.9%</b> (dry weight correction)	

## Hazard properties

None identified

## Determinands (Moisture content: 18.9%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 13.3 mg/kg, converted to compound conc.:14.769 mg/kg or 0.00148%)  
barium sulfate: (Cation conc. entered: 31 mg/kg, converted to compound conc.:44.31 mg/kg or 0.00443%)  
beryllium oxide: (Cation conc. entered: 0.5 mg/kg, converted to compound conc.:1.167 mg/kg or 0.000117%)  
diboron trioxide; boric oxide: (Cation conc. entered: 0.3 mg/kg, converted to compound conc.:0.812 mg/kg or 0.0000812%)  
cadmium oxide: (Cation conc. entered: 0.1 mg/kg, converted to compound conc.:0.0961 mg/kg or 0.00000961%)  
chromium(III) oxide: (Cation conc. entered: 65 mg/kg, converted to compound conc.:79.9 mg/kg or 0.00799%)  
chromium(VI) oxide: (Cation conc. entered: <0.3 mg/kg, converted to compound conc.:<0.485 mg/kg or <0.0000485%)  
**IGNORED Because: "<LOD"**  
cobalt sulfate: (Cation conc. entered: 6.6 mg/kg, converted to compound conc.:14.599 mg/kg or 0.00146%, Note 1 conc.: 0.000555%)  
copper sulphate: (Cation conc. entered: 169 mg/kg, converted to compound conc.:357.004 mg/kg or 0.0357%)  
lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: 10 mg/kg, converted to compound conc.:8.41 mg/kg or 0.000841%, Note 1 conc.: 0.000841%)  
mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.114 mg/kg or <0.0000114%)  
**IGNORED Because: "<LOD"**  
molybdenum(VI) oxide: (Cation conc. entered: 2.4 mg/kg, converted to compound conc.:3.028 mg/kg or 0.000303%)  
nickel(II) oxide (nickel monoxide): (Cation conc. entered: 20.5 mg/kg, converted to compound conc.:21.941 mg/kg or 0.00219%)  
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.148 mg/kg or <0.000215%) **IGNORED Because: "<LOD"**  
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 31 mg/kg, converted to compound conc.:46.544 mg/kg or 0.00465%)  
zinc oxide: (Cation conc. entered: 317 mg/kg, converted to compound conc.:331.854 mg/kg or 0.0332%)  
TPH (C6 to C40) petroleum group: (Whole conc. entered as: 13357 mg/kg or 1.123%)  
confirm TPH has NOT arisen from diesel or petrol: (Confirmed)  
benzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000421%) **IGNORED Because: "<LOD"**  
toluene: (Whole conc. entered as: <0.005 mg/kg or <0.000000421%) **IGNORED Because: "<LOD"**  
ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000421%) **IGNORED Because: "<LOD"**  
xylene: (Whole conc. entered as: <0.005 mg/kg or <0.000000421%) **IGNORED Because: "<LOD"**  
naphthalene: (Whole conc. entered as: <0.04 mg/kg or <0.00000336%) **IGNORED Because: "<LOD"**  
acenaphthylene: (Whole conc. entered as: <0.03 mg/kg or <0.00000252%) **IGNORED Because: "<LOD"**  
acenaphthene: (Whole conc. entered as: <0.05 mg/kg or <0.00000421%) **IGNORED Because: "<LOD"**  
fluorene: (Whole conc. entered as: <0.04 mg/kg or <0.00000336%) **IGNORED Because: "<LOD"**  
phenanthrene: (Whole conc. entered as: <0.03 mg/kg or <0.00000252%) **IGNORED Because: "<LOD"**

anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.00000336%) **IGNORED Because: "<LOD"**  
 fluoranthene: (Whole conc. entered as: <0.03 mg/kg or <0.00000252%) **IGNORED Because: "<LOD"**  
 pyrene: (Whole conc. entered as: <0.03 mg/kg or <0.00000252%) **IGNORED Because: "<LOD"**  
 benzo[a]anthracene: (Whole conc. entered as: <0.06 mg/kg or <0.00000505%) **IGNORED Because: "<LOD"**  
 chrysene: (Whole conc. entered as: <0.02 mg/kg or <0.00000168%) **IGNORED Because: "<LOD"**  
 benzo[b]fluoranthene: (Whole conc. entered as: <0.07 mg/kg or <0.00000589%) **IGNORED Because: "<LOD"**  
 benzo[k]fluoranthene: (Whole conc. entered as: <0.07 mg/kg or <0.00000589%) **IGNORED Because: "<LOD"**  
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.04 mg/kg or <0.00000336%) **IGNORED Because: "<LOD"**  
 indeno[123-cd]pyrene: (Whole conc. entered as: <0.04 mg/kg or <0.00000336%) **IGNORED Because: "<LOD"**  
 dibenz[a,h]anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.00000336%) **IGNORED Because: "<LOD"**  
 benzo[ghi]perylene: (Whole conc. entered as: <0.04 mg/kg or <0.00000336%) **IGNORED Because: "<LOD"**  
 phenol: (Whole conc. entered as: <0.1 mg/kg or <0.00000841%) **IGNORED Because: "<LOD"**  
 1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000252%) **IGNORED Because: "<LOD"**  
 1,1,2-trichloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000252%) **IGNORED Because: "<LOD"**  
 1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.000000505%) **IGNORED Because: "<LOD"**  
 1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.000000505%) **IGNORED Because: "<LOD"**  
 bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: 5.712 mg/kg or 0.00048%)  
 bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.000000168%) **IGNORED Because: "<LOD"**  
 bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000252%) **IGNORED Because: "<LOD"**  
 carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.000000336%) **IGNORED Because: "<LOD"**  
 styrene: (Whole conc. entered as: <0.003 mg/kg or <0.000000252%) **IGNORED Because: "<LOD"**  
 trichloroethene (TCE): (Whole conc. entered as: 0.008 mg/kg or 0.000000673%)  
 vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.000000168%) **IGNORED Because: "<LOD"**  
 chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.000000252%) **IGNORED Because: "<LOD"**

## Test Settings

HP 3(i) on Flam. Liq. 1; H224, Flam. Liq. 2; H225, Flam. Liq. 3; H226: **Force this Hazardous property to non hazardous because: "Non hazardous by HP 3(i). Appendix C of WM3 v1. Figure C3.1. The Waste is not a liquid and does not have a free draining liquid phase. Furthermore carbon banding of the TPH indicates negligible concentrations of short chain carbon fractions. Laboratory interpretation of TPH indicated lube oil and degraded diesel."**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cadmium oxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "copper sulphate"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentaoxide; vanadium pentoxide"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "trichloroethene (TCE)"

### Note 1 , used on:

Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
 Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"  
 Test: "HP 6 on Acute Tox. 4; H332" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
 Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "cobalt sulfate"

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Test: "HP 7 on Carc. 2; H351" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD" for determinand: "cobalt sulfate"  
Test: "HP 10 on Repr. 2; H361, Repr. 2; H361d, Repr. 2; H361f, Repr. 2; H361fd" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"  
Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

**WM3: Unknown oil** , used on:

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Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "TPH (C6 to C40) petroleum group"  
Test: "HP 11 on Muta. 1A; H340, Muta. 1B; H340" for determinand: "TPH (C6 to C40) petroleum group"

**Determinand notes**

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**Note 1** , used on:

determinand: "cobalt sulfate"  
determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

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**Note A** , used on:

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

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**WM3: Unknown oil** , used on:

determinand: "TPH (C6 to C40) petroleum group"

**Classification of sample: WS3**

✔ **Non Hazardous Waste**  
Classified as **17 05 04**  
in the List of Waste

**Sample details**

<p>Sample Name: <b>WS3</b></p> <p>Sample Depth: <b>0.5 m</b></p> <p>Moisture content: <b>10.5%</b> (dry weight correction)</p>	<p>LoW Code: Chapter:     <b>17: Construction and Demolition Wastes (including excavated soil from contaminated sites)</b></p> <p>Entry:       <b>17 05 04 (Soil and stones other than those mentioned in 17 05 03)</b></p>
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**Hazard properties**

None identified

**Determinands** (Moisture content: 10.5%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 15.8 mg/kg, converted to compound conc.:18.879 mg/kg or 0.00189%)  
barium sulfate: (Cation conc. entered: 62 mg/kg, converted to compound conc.:95.358 mg/kg or 0.00954%)  
beryllium oxide: (Cation conc. entered: 0.8 mg/kg, converted to compound conc.:2.009 mg/kg or 0.000201%)  
diboron trioxide; boric oxide: (Cation conc. entered: 1.5 mg/kg, converted to compound conc.:4.371 mg/kg or 0.000437%)  
cadmium oxide: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.103 mg/kg or <0.0000103%)  
**IGNORED Because: "<LOD"**  
chromium(III) oxide: (Cation conc. entered: 65.2 mg/kg, converted to compound conc.:86.238 mg/kg or 0.00862%)  
chromium(VI) oxide: (Cation conc. entered: <0.3 mg/kg, converted to compound conc.:<0.522 mg/kg or <0.0000522%)  
**IGNORED Because: "<LOD"**  
cobalt sulfate: (Cation conc. entered: 7 mg/kg, converted to compound conc.:16.661 mg/kg or 0.00167%, Note 1 conc.: 0.000633%)  
copper sulphate: (Cation conc. entered: 17 mg/kg, converted to compound conc.:38.642 mg/kg or 0.00386%)  
lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: 89 mg/kg, converted to compound conc.:80.543 mg/kg or 0.00805%, Note 1 conc.: 0.00805%)  
mercury dichloride: (Cation conc. entered: 0.2 mg/kg, converted to compound conc.:0.245 mg/kg or 0.0000245%)  
molybdenum(VI) oxide: (Cation conc. entered: 2.3 mg/kg, converted to compound conc.:3.123 mg/kg or 0.000312%)  
nickel(II) oxide (nickel monoxide): (Cation conc. entered: 19.6 mg/kg, converted to compound conc.:22.573 mg/kg or 0.00226%)  
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.311 mg/kg or <0.000231%) **IGNORED Because: "<LOD"**  
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 44 mg/kg, converted to compound conc.:71.084 mg/kg or 0.00711%)  
zinc oxide: (Cation conc. entered: 47 mg/kg, converted to compound conc.:52.943 mg/kg or 0.00529%)  
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <52 mg/kg or <0.00471%) **IGNORED Because: "<LOD"**  
benzene: (Whole conc. entered as: <0.005 mg/kg or <0.00000452%) **IGNORED Because: "<LOD"**  
toluene: (Whole conc. entered as: <0.005 mg/kg or <0.00000452%) **IGNORED Because: "<LOD"**  
ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.00000452%) **IGNORED Because: "<LOD"**  
xylene: (Whole conc. entered as: <0.005 mg/kg or <0.00000452%) **IGNORED Because: "<LOD"**  
naphthalene: (Whole conc. entered as: <0.04 mg/kg or <0.00000362%) **IGNORED Because: "<LOD"**  
acenaphthylene: (Whole conc. entered as: <0.03 mg/kg or <0.00000271%) **IGNORED Because: "<LOD"**  
acenaphthene: (Whole conc. entered as: <0.05 mg/kg or <0.00000452%) **IGNORED Because: "<LOD"**  
fluorene: (Whole conc. entered as: <0.04 mg/kg or <0.00000362%) **IGNORED Because: "<LOD"**  
phenanthrene: (Whole conc. entered as: <0.03 mg/kg or <0.00000271%) **IGNORED Because: "<LOD"**  
anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.00000362%) **IGNORED Because: "<LOD"**  
fluoranthene: (Whole conc. entered as: <0.03 mg/kg or <0.00000271%) **IGNORED Because: "<LOD"**

pyrene: (Whole conc. entered as: <0.03 mg/kg or <0.00000271%) **IGNORED Because: "<LOD"**  
benzo[a]anthracene: (Whole conc. entered as: <0.06 mg/kg or <0.00000543%) **IGNORED Because: "<LOD"**  
chrysene: (Whole conc. entered as: <0.02 mg/kg or <0.00000181%) **IGNORED Because: "<LOD"**  
benzo[b]fluoranthene: (Whole conc. entered as: <0.07 mg/kg or <0.00000633%) **IGNORED Because: "<LOD"**  
benzo[k]fluoranthene: (Whole conc. entered as: <0.07 mg/kg or <0.00000633%) **IGNORED Because: "<LOD"**  
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.04 mg/kg or <0.00000362%) **IGNORED Because: "<LOD"**  
indeno[123-cd]pyrene: (Whole conc. entered as: <0.04 mg/kg or <0.00000362%) **IGNORED Because: "<LOD"**  
dibenz[a,h]anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.00000362%) **IGNORED Because: "<LOD"**  
benzo[ghi]perylene: (Whole conc. entered as: <0.04 mg/kg or <0.00000362%) **IGNORED Because: "<LOD"**  
phenol: (Whole conc. entered as: <0.1 mg/kg or <0.00000905%) **IGNORED Because: "<LOD"**  
1,1,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000271%) **IGNORED Because: "<LOD"**  
1,1,2-trichloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000271%) **IGNORED Because: "<LOD"**  
1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.000000543%) **IGNORED Because: "<LOD"**  
1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.000000543%) **IGNORED Because: "<LOD"**  
bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <0.1 mg/kg or <0.00000905%) **IGNORED Because: "<LOD"**  
bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.000000181%) **IGNORED Because: "<LOD"**  
bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000271%) **IGNORED Because: "<LOD"**  
carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.000000362%) **IGNORED Because: "<LOD"**  
styrene: (Whole conc. entered as: <0.003 mg/kg or <0.000000271%) **IGNORED Because: "<LOD"**  
trichloroethene (TCE): (Whole conc. entered as: 0.008 mg/kg or 0.000000724%)  
vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.000000181%) **IGNORED Because: "<LOD"**  
chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.000000271%) **IGNORED Because: "<LOD"**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "copper sulphate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "mercury dichloride"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentoxide; vanadium pentoxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "trichloroethene (TCE)"

**Note 1** , used on:

Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"  
Test: "HP 6 on Acute Tox. 4; H332" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "cobalt sulfate"  
Test: "HP 7 on Carc. 2; H351" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD " for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 2; H361, Repr. 2; H361d, Repr. 2; H361f, Repr. 2; H361fd" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"

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Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

#### Determinand notes

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**Note 1** , used on:


determinand: "cobalt sulfate"

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**Note A** , used on:

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**Classification of sample: WS4**



**Hazardous Waste**  
Classified as **17 05 03 \***  
in the List of Waste

**Sample details**

Sample Name: <b>WS4</b> Sample Depth: <b>0.5 m</b> Moisture content: <b>6.1%</b> (dry weight correction)	LoW Code: Chapter: <b>17: Construction and Demolition Wastes (including excavated soil from contaminated sites)</b> Entry: <b>17 05 03 * (Soil and stones containing hazardous substances)</b>
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**Hazard properties**

**HP 7: Carcinogenic** "waste which induces cancer or increases its incidence"

Hazard Statements hit:

**Carc. 1B; H350** "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.309%)

**HP 11: Mutagenic** "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

**Muta. 1B; H340** "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.309%)

**Determinands** (Moisture content: 6.1%, dry weight correction)

- arsenic trioxide: (Cation conc. entered: 8.5 mg/kg, converted to compound conc.:10.578 mg/kg or 0.00106%)
- barium sulfate: (Cation conc. entered: 158 mg/kg, converted to compound conc.:253.086 mg/kg or 0.0253%)
- beryllium oxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<1.308 mg/kg or <0.000131%)
- IGNORED Because: "<LOD"**
- diboron trioxide; boric oxide: (Cation conc. entered: 1.3 mg/kg, converted to compound conc.:3.945 mg/kg or 0.000395%)
- cadmium oxide: (Cation conc. entered: 0.3 mg/kg, converted to compound conc.:0.323 mg/kg or 0.0000323%)
- chromium(III) oxide: (Cation conc. entered: 32 mg/kg, converted to compound conc.:44.081 mg/kg or 0.00441%)
- chromium(VI) oxide: (Cation conc. entered: <0.3 mg/kg, converted to compound conc.:<0.544 mg/kg or <0.0000544%)
- IGNORED Because: "<LOD"**
- cobalt sulfate: (Cation conc. entered: 3.5 mg/kg, converted to compound conc.:8.676 mg/kg or 0.000868%, Note 1 conc.: 0.00033%)
- copper sulphate: (Cation conc. entered: 15 mg/kg, converted to compound conc.:35.509 mg/kg or 0.00355%)
- lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: 44 mg/kg, converted to compound conc.:41.47 mg/kg or 0.00415%, Note 1 conc.: 0.00415%)
- mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.128 mg/kg or <0.0000128%)
- IGNORED Because: "<LOD"**
- molybdenum(VI) oxide: (Cation conc. entered: 1.3 mg/kg, converted to compound conc.:1.838 mg/kg or 0.000184%)
- nickel(II) oxide (nickel monoxide): (Cation conc. entered: 12.7 mg/kg, converted to compound conc.:15.233 mg/kg or 0.00152%)

selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.407 mg/kg or <0.000241%) **IGNORED Because: "<LOD"**

divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 24 mg/kg, converted to compound conc.:40.381 mg/kg or 0.00404%)

zinc oxide: (Cation conc. entered: 78 mg/kg, converted to compound conc.:91.506 mg/kg or 0.00915%)

TPH (C6 to C40) petroleum group: (Whole conc. entered as: 3274 mg/kg or 0.309%)  
confirm TPH has NOT arisen from diesel or petrol: (Confirmed)

benzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000471%) **IGNORED Because: "<LOD"**

toluene: (Whole conc. entered as: <0.005 mg/kg or <0.000000471%) **IGNORED Because: "<LOD"**

ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000471%) **IGNORED Because: "<LOD"**

xylene: (Whole conc. entered as: <0.005 mg/kg or <0.000000471%) **IGNORED Because: "<LOD"**

naphthalene: (Whole conc. entered as: 0.37 mg/kg or 0.0000349%)

acenaphthylene: (Whole conc. entered as: <0.15 mg/kg or <0.0000141%) **IGNORED Because: "<LOD"**

acenaphthene: (Whole conc. entered as: 0.29 mg/kg or 0.0000273%)

fluorene: (Whole conc. entered as: 0.22 mg/kg or 0.0000207%)

phenanthrene: (Whole conc. entered as: 2.74 mg/kg or 0.000258%)

anthracene: (Whole conc. entered as: 0.66 mg/kg or 0.0000622%)

fluoranthene: (Whole conc. entered as: 3.37 mg/kg or 0.000318%)

pyrene: (Whole conc. entered as: 2.71 mg/kg or 0.000255%)

benzo[a]anthracene: (Whole conc. entered as: 1.63 mg/kg or 0.000154%)

chrysene: (Whole conc. entered as: 1.22 mg/kg or 0.000115%)

benzo[b]fluoranthene: (Whole conc. entered as: 1.85 mg/kg or 0.000174%)

benzo[k]fluoranthene: (Whole conc. entered as: 1.85 mg/kg or 0.000174%)

benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.88 mg/kg or 0.0000829%)

indeno[123-cd]pyrene: (Whole conc. entered as: 0.6 mg/kg or 0.0000566%)

dibenz[a,h]anthracene: (Whole conc. entered as: <0.2 mg/kg or <0.0000189%) **IGNORED Because: "<LOD"**

benzo[ghi]perylene: (Whole conc. entered as: 0.51 mg/kg or 0.0000481%)

phenol: (Whole conc. entered as: <0.01 mg/kg or <0.000000943%) **IGNORED Because: "<LOD"**

1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**

1,1,2-trichloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**

1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.000000566%) **IGNORED Because: "<LOD"**

1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.000000566%) **IGNORED Because: "<LOD"**

bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <1 mg/kg or <0.0000943%) **IGNORED Because: "<LOD"**

bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.000000189%) **IGNORED Because: "<LOD"**

bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**

carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.000000377%) **IGNORED Because: "<LOD"**

styrene: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**

trichloroethene (TCE): (Whole conc. entered as: 0.01 mg/kg or 0.000000943%)

vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.000000189%) **IGNORED Because: "<LOD"**

chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**

## Test Settings

HP 3(i) on Flam. Liq. 1; H224, Flam. Liq. 2; H225, Flam. Liq. 3; H226: **Force this Hazardous property to non hazardous because: "Non hazardous by HP 3(i). Appendix C of WM3 v1. Figure C3.1. The Waste is not a liquid and does not have a free draining liquid phase. Furthermore carbon banding of the TPH indicates negligible concentrations of short chain carbon fractions."**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ...", used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cadmium oxide"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"



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Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "copper sulphate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "naphthalene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "acenaphthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluorene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "phenanthrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "pyrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[b]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[k]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[ghi]perylene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentaoxide; vanadium pentoxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "trichloroethene (TCE)"

**Note 1** , used on:

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Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"  
Test: "HP 6 on Acute Tox. 4; H332" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "cobalt sulfate"  
Test: "HP 7 on Carc. 2; H351" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 2; H361, Repr. 2; H361d, Repr. 2; H361f, Repr. 2; H361fd" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"  
Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

**WM3: Unknown oil** , used on:

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Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "TPH (C6 to C40) petroleum group"  
Test: "HP 11 on Muta. 1A; H340, Muta. 1B; H340" for determinand: "TPH (C6 to C40) petroleum group"

**Determinand notes**

**Note 1** , used on:

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determinand: "cobalt sulfate"  
determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**Note A** , used on:

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determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**WM3: Unknown oil** , used on:

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determinand: "TPH (C6 to C40) petroleum group"

**Classification of sample: WS5**



**Hazardous Waste**  
Classified as **17 05 03 \***  
in the List of Waste

**Sample details**

<p>Sample Name: <b>WS5</b></p> <p>Sample Depth: <b>1 m</b></p> <p>Moisture content: <b>5.8%</b> (dry weight correction)</p>	<p>LoW Code: Chapter:       <b>17: Construction and Demolition Wastes (including excavated soil from contaminated sites)</b></p> <p>Entry:         <b>17 05 03 * (Soil and stones containing hazardous substances)</b></p>
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**Hazard properties**

**HP 7: Carcinogenic** "waste which induces cancer or increases its incidence"

Hazard Statements hit:

**Carc. 1B; H350** "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.35%)

**HP 11: Mutagenic** "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

**Muta. 1B; H340** "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.35%)

**Determinands** (Moisture content: 5.8%, dry weight correction)

- arsenic trioxide: (Cation conc. entered: 9.5 mg/kg, converted to compound conc.:11.855 mg/kg or 0.00119%)
- barium sulfate: (Cation conc. entered: 462 mg/kg, converted to compound conc.:742.133 mg/kg or 0.0742%)
- beryllium oxide: (Cation conc. entered: 0.6 mg/kg, converted to compound conc.:1.574 mg/kg or 0.000157%)
- diboron trioxide; boric oxide: (Cation conc. entered: 1.2 mg/kg, converted to compound conc.:3.652 mg/kg or 0.000365%)
- cadmium oxide: (Cation conc. entered: 0.8 mg/kg, converted to compound conc.:0.864 mg/kg or 0.0000864%)
- chromium(III) oxide: (Cation conc. entered: 35 mg/kg, converted to compound conc.:48.35 mg/kg or 0.00484%)
- chromium(VI) oxide: (Cation conc. entered: <0.3 mg/kg, converted to compound conc.:<0.545 mg/kg or <0.0000545%)
- IGNORED Because: "<LOD"**
- cobalt sulfate: (Cation conc. entered: 4.3 mg/kg, converted to compound conc.:10.689 mg/kg or 0.00107%, Note 1 conc.: 0.000406%)
- copper sulphate: (Cation conc. entered: 15 mg/kg, converted to compound conc.:35.61 mg/kg or 0.00356%)
- lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: 78 mg/kg, converted to compound conc.:73.724 mg/kg or 0.00737%, Note 1 conc.: 0.00737%)
- mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.128 mg/kg or <0.0000128%)
- IGNORED Because: "<LOD"**
- molybdenum(VI) oxide: (Cation conc. entered: 1.6 mg/kg, converted to compound conc.:2.269 mg/kg or 0.000227%)
- nickel(II) oxide (nickel monoxide): (Cation conc. entered: 14 mg/kg, converted to compound conc.:16.84 mg/kg or 0.00168%)

selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.414 mg/kg or <0.000241%) **IGNORED Because: "<LOD"**

divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 29 mg/kg, converted to compound conc.:48.932 mg/kg or 0.00489%)

zinc oxide: (Cation conc. entered: 158 mg/kg, converted to compound conc.:185.884 mg/kg or 0.0186%)

TPH (C6 to C40) petroleum group: (Whole conc. entered as: 3699 mg/kg or 0.35%)

confirm TPH has NOT arisen from diesel or petrol: (Confirmed)

benzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000473%) **IGNORED Because: "<LOD"**

toluene: (Whole conc. entered as: <0.005 mg/kg or <0.000000473%) **IGNORED Because: "<LOD"**

ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000473%) **IGNORED Because: "<LOD"**

xylene: (Whole conc. entered as: <0.005 mg/kg or <0.000000473%) **IGNORED Because: "<LOD"**

naphthalene: (Whole conc. entered as: <0.2 mg/kg or <0.0000189%) **IGNORED Because: "<LOD"**

acenaphthylene: (Whole conc. entered as: <0.15 mg/kg or <0.0000142%) **IGNORED Because: "<LOD"**

acenaphthene: (Whole conc. entered as: <0.25 mg/kg or <0.0000236%) **IGNORED Because: "<LOD"**

fluorene: (Whole conc. entered as: <0.2 mg/kg or <0.0000189%) **IGNORED Because: "<LOD"**

phenanthrene: (Whole conc. entered as: 0.84 mg/kg or 0.0000794%)

anthracene: (Whole conc. entered as: 0.23 mg/kg or 0.0000217%)

fluoranthene: (Whole conc. entered as: 1.13 mg/kg or 0.000107%)

pyrene: (Whole conc. entered as: 1.07 mg/kg or 0.000101%)

benzo[a]anthracene: (Whole conc. entered as: 0.78 mg/kg or 0.0000737%)

chrysene: (Whole conc. entered as: 0.71 mg/kg or 0.0000671%)

benzo[b]fluoranthene: (Whole conc. entered as: 0.98 mg/kg or 0.0000926%)

benzo[k]fluoranthene: (Whole conc. entered as: 0.98 mg/kg or 0.0000926%)

benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.57 mg/kg or 0.0000539%)

indeno[123-cd]pyrene: (Whole conc. entered as: 0.49 mg/kg or 0.0000463%)

dibenz[a,h]anthracene: (Whole conc. entered as: <0.2 mg/kg or <0.0000189%) **IGNORED Because: "<LOD"**

benzo[ghi]perylene: (Whole conc. entered as: 0.38 mg/kg or 0.0000359%)

phenol: (Whole conc. entered as: <0.01 mg/kg or <0.000000945%) **IGNORED Because: "<LOD"**

1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000284%) **IGNORED Because: "<LOD"**

1,1,2-trichloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000284%) **IGNORED Because: "<LOD"**

1,2,4-trimethylbenzene: (Whole conc. entered as: 0.057 mg/kg or 0.00000539%)

1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.000000567%) **IGNORED Because: "<LOD"**

bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <1 mg/kg or <0.0000945%) **IGNORED Because: "<LOD"**

bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.000000189%) **IGNORED Because: "<LOD"**

bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000284%) **IGNORED Because: "<LOD"**

carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.000000378%) **IGNORED Because: "<LOD"**

styrene: (Whole conc. entered as: <0.003 mg/kg or <0.000000284%) **IGNORED Because: "<LOD"**

trichloroethene (TCE): (Whole conc. entered as: <0.003 mg/kg or <0.000000284%) **IGNORED Because: "<LOD"**

vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.000000189%) **IGNORED Because: "<LOD"**

chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.000000284%) **IGNORED Because: "<LOD"**

## Test Settings

HP 3(i) on Flam. Liq. 1; H224, Flam. Liq. 2; H225, Flam. Liq. 3; H226: **Force this Hazardous property to non hazardous because: "Non hazardous by HP 3(i). Appendix C of WM3 v1. Figure C3.1. The Waste is not a liquid and does not have a free draining liquid phase. Furthermore carbon banding of the TPH indicates negligible concentrations of short chain carbon fractions. 1,2,4-trimethylbenzene considered to be not present at a significant concentration."**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ...", used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cadmium oxide"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"

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Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "copper sulphate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "phenanthrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "pyrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[b]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[k]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[ghi]perylene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentaoxide; vanadium pentoxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "1,2,4-trimethylbenzene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"

**Note 1** , used on:

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Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"  
Test: "HP 6 on Acute Tox. 4; H332" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "cobalt sulfate"  
Test: "HP 7 on Carc. 2; H351" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 2; H361, Repr. 2; H361d, Repr. 2; H361f, Repr. 2; H361fd" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"  
Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

**WM3: Unknown oil** , used on:

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Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "TPH (C6 to C40) petroleum group"  
Test: "HP 11 on Muta. 1A; H340, Muta. 1B; H340" for determinand: "TPH (C6 to C40) petroleum group"

**Determinand notes**

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**Note 1** , used on:

determinand: "cobalt sulfate"  
determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**Note A** , used on:

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

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**WM3: Unknown oil** , used on:

determinand: "TPH (C6 to C40) petroleum group"

**Classification of sample: WS7**

✔ **Non Hazardous Waste**  
Classified as **17 05 04**  
in the List of Waste

**Sample details**

Sample Name: <b>WS7</b> Sample Depth: <b>0.7 m</b> Moisture content: <b>7.8%</b> (dry weight correction)	LoW Code: Chapter: <b>17: Construction and Demolition Wastes (including excavated soil from contaminated sites)</b> Entry: <b>17 05 04 (Soil and stones other than those mentioned in 17 05 03)</b>
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**Hazard properties**

None identified

**Determinands** (Moisture content: 7.8%, dry weight correction)

- arsenic trioxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<0.612 mg/kg or <0.0000612%) **IGNORED Because: "<LOD"**
- barium sulfate: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.577 mg/kg or <0.000158%) **IGNORED Because: "<LOD"**
- beryllium oxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<1.287 mg/kg or <0.000129%) **IGNORED Because: "<LOD"**
- diboron trioxide; boric oxide: (Cation conc. entered: 1.6 mg/kg, converted to compound conc.:4.779 mg/kg or 0.000478%)
- cadmium oxide: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.106 mg/kg or <0.0000106%) **IGNORED Because: "<LOD"**
- chromium(III) oxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<0.678 mg/kg or <0.0000678%) **IGNORED Because: "<LOD"**
- cobalt sulfate: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<1.22 mg/kg or <0.000122%, Note 1 conc.: <0.0000464%) **IGNORED Because: "<LOD"**
- copper sulphate: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.33 mg/kg or <0.000233%) **IGNORED Because: "<LOD"**
- lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: <4 mg/kg, converted to compound conc.:<3.711 mg/kg or <0.000371%, Note 1 conc.: <0.000371%) **IGNORED Because: "<LOD"**
- mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.126 mg/kg or <0.0000126%) **IGNORED Because: "<LOD"**
- molybdenum(VI) oxide: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.139 mg/kg or <0.0000139%) **IGNORED Because: "<LOD"**
- nickel(II) oxide (nickel monoxide): (Cation conc. entered: <0.7 mg/kg, converted to compound conc.:<0.826 mg/kg or <0.0000826%) **IGNORED Because: "<LOD"**
- selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.369 mg/kg or <0.000237%) **IGNORED Because: "<LOD"**
- divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<1.656 mg/kg or <0.000166%) **IGNORED Because: "<LOD"**
- zinc oxide: (Cation conc. entered: <5 mg/kg, converted to compound conc.:<5.773 mg/kg or <0.000577%) **IGNORED Because: "<LOD"**
- TPH (C6 to C40) petroleum group: (Whole conc. entered as: 419 mg/kg or 0.0389%)
- benzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000464%) **IGNORED Because: "<LOD"**
- toluene: (Whole conc. entered as: <0.005 mg/kg or <0.000000464%) **IGNORED Because: "<LOD"**
- ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000464%) **IGNORED Because: "<LOD"**
- xylene: (Whole conc. entered as: <0.005 mg/kg or <0.000000464%) **IGNORED Because: "<LOD"**
- naphthalene: (Whole conc. entered as: 0.06 mg/kg or 0.00000557%)

acenaphthylene: (Whole conc. entered as: 0.04 mg/kg or 0.00000371%)  
 acenaphthene: (Whole conc. entered as: 0.06 mg/kg or 0.00000557%)  
 fluorene: (Whole conc. entered as: 0.04 mg/kg or 0.00000371%)  
 phenanthrene: (Whole conc. entered as: 0.82 mg/kg or 0.0000761%)  
 anthracene: (Whole conc. entered as: 0.24 mg/kg or 0.0000223%)  
 fluoranthene: (Whole conc. entered as: 1.79 mg/kg or 0.000166%)  
 pyrene: (Whole conc. entered as: 1.85 mg/kg or 0.000172%)  
 benzo[a]anthracene: (Whole conc. entered as: 1.18 mg/kg or 0.000109%)  
 chrysene: (Whole conc. entered as: 1.08 mg/kg or 0.0001%)  
 benzo[b]fluoranthene: (Whole conc. entered as: 1.74 mg/kg or 0.000161%)  
 benzo[k]fluoranthene: (Whole conc. entered as: 1.74 mg/kg or 0.000161%)  
 benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.82 mg/kg or 0.0000761%)  
 indeno[123-cd]pyrene: (Whole conc. entered as: 0.77 mg/kg or 0.0000714%)  
 dibenz[a,h]anthracene: (Whole conc. entered as: 0.12 mg/kg or 0.0000111%)  
 benzo[ghi]perylene: (Whole conc. entered as: 0.57 mg/kg or 0.0000529%)  
 phenol: (Whole conc. entered as: <0.01 mg/kg or <0.000000928%) **IGNORED Because: "<LOD"**  
 1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000278%) **IGNORED Because: "<LOD"**  
 1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.000000557%) **IGNORED Because: "<LOD"**  
 1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.000000557%) **IGNORED Because: "<LOD"**  
 bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <0.1 mg/kg or <0.00000928%) **IGNORED Because: "<LOD"**  
 bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.000000186%) **IGNORED Because: "<LOD"**  
 bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000278%) **IGNORED Because: "<LOD"**  
 carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.000000371%) **IGNORED Because: "<LOD"**  
 styrene: (Whole conc. entered as: <0.003 mg/kg or <0.000000278%) **IGNORED Because: "<LOD"**  
 trichloroethene (TCE): (Whole conc. entered as: <0.003 mg/kg or <0.000000278%) **IGNORED Because: "<LOD"**  
 coronene: (Whole conc. entered as: 0.09 mg/kg or 0.00000835%)  
 vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.000000186%) **IGNORED Because: "<LOD"**  
 chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.000000278%) **IGNORED Because: "<LOD"**

## Test Settings

HP 3(i) on Flam. Liq. 1; H224, Flam. Liq. 2; H225, Flam. Liq. 3; H226: **Force this Hazardous property to non hazardous because: "Non hazardous by HP 3(i). Appendix C of WM3 v1. Figure C3.1. The Waste is not a liquid and does not have a free draining liquid phase. Furthermore at the concentrations reported the waste would pass the inert WAC mineral oil criteria and therefore cannot display flammable hazardous property."**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "naphthalene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "acenaphthene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluorene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "phenanthrene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "anthracene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluoranthene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "pyrene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]anthracene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chrysene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[b]fluoranthene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[k]fluoranthene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "dibenz[a,h]anthracene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[ghi]perylene"  
 Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "TPH (C6 to C40) petroleum group"

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**Determinand notes**

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**WM3: Unknown oil** , used on:

determinand: "TPH (C6 to C40) petroleum group"

Classification of sample: WS8

✔ **Non Hazardous Waste**  
Classified as **17 05 04**  
in the List of Waste

Sample details

Sample Name:	LoW Code:
<b>WS8</b>	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
<b>1 m</b>	
Moisture content: <b>0%</b> (dry weight correction)	

Hazard properties

None identified

Determinands (Moisture content: 0%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 5.4 mg/kg, converted to compound conc.:7.13 mg/kg or 0.000713%)  
barium sulfate: (Cation conc. entered: 45 mg/kg, converted to compound conc.:76.478 mg/kg or 0.00765%)  
beryllium oxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<1.388 mg/kg or <0.000139%)  
**IGNORED Because: "<LOD"**  
diboron trioxide; boric oxide: (Cation conc. entered: 0.3 mg/kg, converted to compound conc.:0.966 mg/kg or 0.0000966%)  
cadmium oxide: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.114 mg/kg or <0.0000114%)  
**IGNORED Because: "<LOD"**  
chromium(III) oxide: (Cation conc. entered: 7.7 mg/kg, converted to compound conc.:11.254 mg/kg or 0.00113%)  
chromium(VI) oxide: (Cation conc. entered: <0.3 mg/kg, converted to compound conc.:<0.577 mg/kg or <0.0000577%)  
**IGNORED Because: "<LOD"**  
cobalt sulfate: (Cation conc. entered: 2.6 mg/kg, converted to compound conc.:6.838 mg/kg or 0.000684%, Note 1 conc.: 0.00026%)  
copper sulphate: (Cation conc. entered: 4 mg/kg, converted to compound conc.:10.047 mg/kg or 0.001%)  
lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: 10 mg/kg, converted to compound conc.:10 mg/kg or 0.001%, Note 1 conc.: 0.001%)  
mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.135 mg/kg or <0.0000135%)  
**IGNORED Because: "<LOD"**  
molybdenum(VI) oxide: (Cation conc. entered: 0.2 mg/kg, converted to compound conc.:0.3 mg/kg or 0.00003%)  
nickel(II) oxide (nickel monoxide): (Cation conc. entered: 6.4 mg/kg, converted to compound conc.:8.145 mg/kg or 0.000814%)  
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.554 mg/kg or <0.000255%) **IGNORED Because: "<LOD"**  
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 14 mg/kg, converted to compound conc.:24.993 mg/kg or 0.0025%)  
zinc oxide: (Cation conc. entered: 27 mg/kg, converted to compound conc.:33.607 mg/kg or 0.00336%)  
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <52 mg/kg or <0.0052%) **IGNORED Because: "<LOD"**  
benzene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
toluene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
xylene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
naphthalene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
acenaphthylene: (Whole conc. entered as: <0.03 mg/kg or <0.000003%) **IGNORED Because: "<LOD"**  
acenaphthene: (Whole conc. entered as: <0.05 mg/kg or <0.000005%) **IGNORED Because: "<LOD"**  
fluorene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**



phenanthrene: (Whole conc. entered as: 0.03 mg/kg or 0.000003%)  
anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
fluoranthene: (Whole conc. entered as: 0.05 mg/kg or 0.000005%)  
pyrene: (Whole conc. entered as: 0.06 mg/kg or 0.000006%)  
benzo[a]anthracene: (Whole conc. entered as: 0.06 mg/kg or 0.000006%)  
chrysene: (Whole conc. entered as: 0.03 mg/kg or 0.000003%)  
benzo[b]fluoranthene: (Whole conc. entered as: <0.07 mg/kg or <0.000007%) **IGNORED Because: "<LOD"**  
benzo[k]fluoranthene: (Whole conc. entered as: <0.07 mg/kg or <0.000007%) **IGNORED Because: "<LOD"**  
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
indeno[123-cd]pyrene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
dibenz[a,h]anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
benzo[ghi]perylene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
phenol: (Whole conc. entered as: <0.01 mg/kg or <0.000001%) **IGNORED Because: "<LOD"**  
1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
1,1,2-trichloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.0000006%) **IGNORED Because: "<LOD"**  
1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.0000006%) **IGNORED Because: "<LOD"**  
bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**  
bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.0000002%) **IGNORED Because: "<LOD"**  
bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.0000004%) **IGNORED Because: "<LOD"**  
styrene: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
trichloroethene (TCE): (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.0000002%) **IGNORED Because: "<LOD"**  
chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "copper sulphate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "phenanthrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "pyrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentoxide; vanadium pentoxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"

## Determinand notes

**Note 1** , used on:

determinand: "cobalt sulfate"  
determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**Note A** , used on:

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Classification of sample: WS10

✔ **Non Hazardous Waste**  
Classified as **17 05 04**  
in the List of Waste

Sample details

<p>Sample Name: <b>WS10</b></p> <p>Sample Depth: <b>1 m</b></p> <p>Moisture content: <b>16.2%</b> (dry weight correction)</p>	<p>LoW Code: Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)</p> <p>Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)</p>
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Hazard properties

None identified

Determinands (Moisture content: 16.2%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 13.6 mg/kg, converted to compound conc.:15.453 mg/kg or 0.00155%)  
barium sulfate: (Cation conc. entered: 241 mg/kg, converted to compound conc.:352.482 mg/kg or 0.0352%)  
beryllium oxide: (Cation conc. entered: 0.9 mg/kg, converted to compound conc.:2.15 mg/kg or 0.000215%)  
diboron trioxide; boric oxide: (Cation conc. entered: 2.7 mg/kg, converted to compound conc.:7.482 mg/kg or 0.000748%)  
cadmium oxide: (Cation conc. entered: 0.1 mg/kg, converted to compound conc.:0.0983 mg/kg or 0.0000983%)  
chromium(III) oxide: (Cation conc. entered: 55.2 mg/kg, converted to compound conc.:69.43 mg/kg or 0.00694%)  
chromium(VI) oxide: (Cation conc. entered: <0.3 mg/kg, converted to compound conc.:<0.497 mg/kg or <0.0000497%)  
**IGNORED Because: "<LOD"**  
cobalt sulfate: (Cation conc. entered: 8.9 mg/kg, converted to compound conc.:20.144 mg/kg or 0.00201%, Note 1 conc.: 0.000766%)  
copper sulphate: (Cation conc. entered: 19 mg/kg, converted to compound conc.:41.069 mg/kg or 0.00411%)  
lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: 176 mg/kg, converted to compound conc.:151.463 mg/kg or 0.0151%, Note 1 conc.: 0.0151%)  
mercury dichloride: (Cation conc. entered: 0.2 mg/kg, converted to compound conc.:0.233 mg/kg or 0.0000233%)  
molybdenum(VI) oxide: (Cation conc. entered: 1.7 mg/kg, converted to compound conc.:2.195 mg/kg or 0.000219%)  
nickel(II) oxide (nickel monoxide): (Cation conc. entered: 25.4 mg/kg, converted to compound conc.:27.817 mg/kg or 0.00278%)  
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.198 mg/kg or <0.00022%) **IGNORED Because: "<LOD"**  
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 41 mg/kg, converted to compound conc.:62.988 mg/kg or 0.0063%)  
zinc oxide: (Cation conc. entered: 174 mg/kg, converted to compound conc.:186.386 mg/kg or 0.0186%)  
TPH (C6 to C40) petroleum group: (Whole conc. entered as: 990 mg/kg or 0.0852%)  
benzene: (Whole conc. entered as: <0.005 mg/kg or <0.00000043%) **IGNORED Because: "<LOD"**  
toluene: (Whole conc. entered as: <0.005 mg/kg or <0.00000043%) **IGNORED Because: "<LOD"**  
ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.00000043%) **IGNORED Because: "<LOD"**  
xylene: (Whole conc. entered as: <0.005 mg/kg or <0.00000043%) **IGNORED Because: "<LOD"**  
naphthalene: (Whole conc. entered as: 0.07 mg/kg or 0.00000602%)  
acenaphthylene: (Whole conc. entered as: 0.03 mg/kg or 0.00000258%)  
acenaphthene: (Whole conc. entered as: 0.06 mg/kg or 0.00000516%)  
fluorene: (Whole conc. entered as: <0.04 mg/kg or <0.00000344%) **IGNORED Because: "<LOD"**  
phenanthrene: (Whole conc. entered as: 0.55 mg/kg or 0.0000473%)  
anthracene: (Whole conc. entered as: 0.19 mg/kg or 0.0000164%)  
fluoranthene: (Whole conc. entered as: 1.79 mg/kg or 0.000154%)  
pyrene: (Whole conc. entered as: 3.2 mg/kg or 0.000275%)

benzo[a]anthracene: (Whole conc. entered as: 1.99 mg/kg or 0.000171%)  
chrysene: (Whole conc. entered as: 1.79 mg/kg or 0.000154%)  
benzo[b]fluoranthene: (Whole conc. entered as: 3.57 mg/kg or 0.000307%)  
benzo[k]fluoranthene: (Whole conc. entered as: 3.57 mg/kg or 0.000307%)  
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 1.88 mg/kg or 0.000162%)  
indeno[123-cd]pyrene: (Whole conc. entered as: 1.51 mg/kg or 0.00013%)  
dibenz[a,h]anthracene: (Whole conc. entered as: 0.27 mg/kg or 0.0000232%)  
benzo[ghi]perylene: (Whole conc. entered as: 1.23 mg/kg or 0.000106%)  
phenol: (Whole conc. entered as: <0.01 mg/kg or <0.000000861%) **IGNORED Because: "<LOD"**  
1,1,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000258%) **IGNORED Because: "<LOD"**  
1,1,2-trichloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000258%) **IGNORED Because: "<LOD"**  
1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.000000516%) **IGNORED Because: "<LOD"**  
1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.000000516%) **IGNORED Because: "<LOD"**  
bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <1 mg/kg or <0.0000861%) **IGNORED Because: "<LOD"**  
bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.000000172%) **IGNORED Because: "<LOD"**  
bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000258%) **IGNORED Because: "<LOD"**  
carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.000000344%) **IGNORED Because: "<LOD"**  
styrene: (Whole conc. entered as: <0.003 mg/kg or <0.000000258%) **IGNORED Because: "<LOD"**  
trichloroethene (TCE): (Whole conc. entered as: <0.003 mg/kg or <0.000000258%) **IGNORED Because: "<LOD"**  
coronene: (Whole conc. entered as: 0.2 mg/kg or 0.0000172%)  
vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.000000172%) **IGNORED Because: "<LOD"**  
chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.000000258%) **IGNORED Because: "<LOD"**

## Test Settings

HP 3(i) on Flam. Liq. 1; H224, Flam. Liq. 2; H225, Flam. Liq. 3; H226: **Force this Hazardous property to non hazardous because: "Non hazardous by HP 3(i). Appendix C of WM3 v1. Figure C3.1. The Waste is not a liquid and does not have a free draining liquid phase. Furthermore carbon banding of the TPH indicates negligible concentrations of short chain carbon fractions."**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cadmium oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "copper sulphate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "mercury dichloride"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "naphthalene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "acenaphthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "phenanthrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "pyrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[b]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[k]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "dibenz[a,h]anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[ghi]perylene"

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Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentaoxide; vanadium pentoxide"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "TPH (C6 to C40) petroleum group"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"

**Note 1** , used on:

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Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"

Test: "HP 6 on Acute Tox. 4; H332" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "cobalt sulfate"

Test: "HP 7 on Carc. 2; H351" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 10 on Repr. 2; H361, Repr. 2; H361d, Repr. 2; H361f, Repr. 2; H361fd" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"

Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

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**Determinand notes**

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**Note 1** , used on:

determinand: "cobalt sulfate"

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

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**Note A** , used on:


determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

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**WM3: Unknown oil** , used on:

determinand: "TPH (C6 to C40) petroleum group"

**Classification of sample: WS11**

 **Hazardous Waste**  
Classified as **17 05 03 \***  
in the List of Waste

**Sample details**

Sample Name: <b>WS11</b>	LoW Code: Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)	
Sample Depth: <b>0.5 m</b>	Entry: 17 05 03 * (Soil and stones containing hazardous substances)	
Moisture content: <b>7.5%</b> (dry weight correction)		

**Hazard properties**

**HP 7: Carcinogenic** "waste which induces cancer or increases its incidence"

Hazard Statements hit:

**Carc. 1B; H350** "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.227%)

**HP 11: Mutagenic** "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

**Muta. 1B; H340** "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.227%)

**Determinands** (Moisture content: 7.5%, dry weight correction)

- arsenic trioxide: (Cation conc. entered: 9 mg/kg, converted to compound conc.:11.054 mg/kg or 0.00111%)
- barium sulfate: (Cation conc. entered: 130 mg/kg, converted to compound conc.:205.523 mg/kg or 0.0206%)
- beryllium oxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<1.291 mg/kg or <0.000129%)  
**IGNORED Because: "<LOD"**
- diboron trioxide; boric oxide: (Cation conc. entered: 1.1 mg/kg, converted to compound conc.:3.295 mg/kg or 0.000329%)
- cadmium oxide: (Cation conc. entered: 0.2 mg/kg, converted to compound conc.:0.213 mg/kg or 0.0000213%)
- chromium(III) oxide: (Cation conc. entered: 58.7 mg/kg, converted to compound conc.:79.808 mg/kg or 0.00798%)
- chromium(VI) oxide: (Cation conc. entered: <0.3 mg/kg, converted to compound conc.:<0.537 mg/kg or <0.0000537%)  
**IGNORED Because: "<LOD"**
- cobalt sulfate: (Cation conc. entered: 4.8 mg/kg, converted to compound conc.:11.743 mg/kg or 0.00117%, Note 1 conc.: 0.000447%)
- copper sulphate: (Cation conc. entered: 10 mg/kg, converted to compound conc.:23.365 mg/kg or 0.00234%)
- lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: 35 mg/kg, converted to compound conc.:32.558 mg/kg or 0.00326%, Note 1 conc.: 0.00326%)
- mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.126 mg/kg or <0.0000126%)  
**IGNORED Because: "<LOD"**
- molybdenum(VI) oxide: (Cation conc. entered: 3.3 mg/kg, converted to compound conc.:4.605 mg/kg or 0.000461%)
- nickel(II) oxide (nickel monoxide): (Cation conc. entered: 12.3 mg/kg, converted to compound conc.:14.561 mg/kg or 0.00146%)

selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.375 mg/kg or <0.000238%) **IGNORED Because: "<LOD"**

divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 29 mg/kg, converted to compound conc.:48.158 mg/kg or 0.00482%)

zinc oxide: (Cation conc. entered: 65 mg/kg, converted to compound conc.:75.262 mg/kg or 0.00753%)

TPH (C6 to C40) petroleum group: (Whole conc. entered as: 2440 mg/kg or 0.227%)  
confirm TPH has NOT arisen from diesel or petrol: (Confirmed)

benzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000465%) **IGNORED Because: "<LOD"**

toluene: (Whole conc. entered as: <0.005 mg/kg or <0.000000465%) **IGNORED Because: "<LOD"**

ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.000000465%) **IGNORED Because: "<LOD"**

xylene: (Whole conc. entered as: <0.005 mg/kg or <0.000000465%) **IGNORED Because: "<LOD"**

naphthalene: (Whole conc. entered as: <0.2 mg/kg or <0.0000186%) **IGNORED Because: "<LOD"**

acenaphthylene: (Whole conc. entered as: <0.15 mg/kg or <0.000014%) **IGNORED Because: "<LOD"**

acenaphthene: (Whole conc. entered as: <0.25 mg/kg or <0.0000233%) **IGNORED Because: "<LOD"**

fluorene: (Whole conc. entered as: <0.2 mg/kg or <0.0000186%) **IGNORED Because: "<LOD"**

phenanthrene: (Whole conc. entered as: 0.51 mg/kg or 0.0000474%)

anthracene: (Whole conc. entered as: <0.2 mg/kg or <0.0000186%) **IGNORED Because: "<LOD"**

fluoranthene: (Whole conc. entered as: 0.75 mg/kg or 0.0000698%)

pyrene: (Whole conc. entered as: 0.71 mg/kg or 0.000066%)

benzo[a]anthracene: (Whole conc. entered as: 0.52 mg/kg or 0.0000484%)

chrysene: (Whole conc. entered as: 0.4 mg/kg or 0.0000372%)

benzo[b]fluoranthene: (Whole conc. entered as: 0.53 mg/kg or 0.0000493%)

benzo[k]fluoranthene: (Whole conc. entered as: 0.53 mg/kg or 0.0000493%)

benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.3 mg/kg or 0.0000279%)

indeno[123-cd]pyrene: (Whole conc. entered as: 0.24 mg/kg or 0.0000223%)

dibenz[a,h]anthracene: (Whole conc. entered as: <0.2 mg/kg or <0.0000186%) **IGNORED Because: "<LOD"**

benzo[ghi]perylene: (Whole conc. entered as: <0.2 mg/kg or <0.0000186%) **IGNORED Because: "<LOD"**

phenol: (Whole conc. entered as: <0.01 mg/kg or <0.00000093%) **IGNORED Because: "<LOD"**

1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000279%) **IGNORED Because: "<LOD"**

1,1,2-trichloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000279%) **IGNORED Because: "<LOD"**

1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.000000558%) **IGNORED Because: "<LOD"**

1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.000000558%) **IGNORED Because: "<LOD"**

bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <1 mg/kg or <0.000093%) **IGNORED Because: "<LOD"**

bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.000000186%) **IGNORED Because: "<LOD"**

bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000279%) **IGNORED Because: "<LOD"**

carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.000000372%) **IGNORED Because: "<LOD"**

styrene: (Whole conc. entered as: <0.003 mg/kg or <0.000000279%) **IGNORED Because: "<LOD"**

trichloroethene (TCE): (Whole conc. entered as: 0.012 mg/kg or 0.00000112%)

vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.000000186%) **IGNORED Because: "<LOD"**

chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.000000279%) **IGNORED Because: "<LOD"**

## Test Settings

HP 3(i) on Flam. Liq. 1; H224, Flam. Liq. 2; H225, Flam. Liq. 3; H226: **Force this Hazardous property to non hazardous because: "Non hazardous by HP 3(i). Appendix C of WM3 v1. Figure C3.1. The Waste is not a liquid and does not have a free draining liquid phase. Furthermore carbon banding of the TPH indicates negligible concentrations of short chain carbon fractions."**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ...", used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cadmium oxide"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"

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Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "copper sulphate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "phenanthrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "pyrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[b]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[k]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentoxide; vanadium pentoxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "trichloroethene (TCE)"

**Note 1** , used on:

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Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"  
Test: "HP 6 on Acute Tox. 4; H332" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "cobalt sulfate"  
Test: "HP 7 on Carc. 2; H351" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 2; H361, Repr. 2; H361d, Repr. 2; H361f, Repr. 2; H361fd" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"  
Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

**WM3: Unknown oil** , used on:

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Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "TPH (C6 to C40) petroleum group"  
Test: "HP 11 on Muta. 1A; H340, Muta. 1B; H340" for determinand: "TPH (C6 to C40) petroleum group"

**Determinand notes**

**Note 1** , used on:

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determinand: "cobalt sulfate"  
determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**Note A** , used on:

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determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**WM3: Unknown oil** , used on:

---

determinand: "TPH (C6 to C40) petroleum group"

**Classification of sample: BH1**

✔ **Non Hazardous Waste**  
Classified as **17 05 04**  
in the List of Waste

**Sample details**

<p>Sample Name: <b>BH1</b></p> <p>Sample Depth: <b>0.5 m</b></p> <p>Moisture content: <b>5.9%</b> (dry weight correction)</p>	<p>LoW Code: Chapter:     <b>17: Construction and Demolition Wastes (including excavated soil from contaminated sites)</b></p> <p>Entry:       <b>17 05 04 (Soil and stones other than those mentioned in 17 05 03)</b></p>
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**Hazard properties**

None identified

**Determinands** (Moisture content: 5.9%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 12.5 mg/kg, converted to compound conc.:15.585 mg/kg or 0.00156%)  
barium sulfate: (Cation conc. entered: 625 mg/kg, converted to compound conc.:1003.02 mg/kg or 0.1%)  
beryllium oxide: (Cation conc. entered: <0.5 mg/kg, converted to compound conc.:<1.31 mg/kg or <0.000131%)  
**IGNORED Because: "<LOD"**  
diboron trioxide; boric oxide: (Cation conc. entered: 1 mg/kg, converted to compound conc.:3.04 mg/kg or 0.000304%)  
cadmium oxide: (Cation conc. entered: 1.8 mg/kg, converted to compound conc.:1.942 mg/kg or 0.000194%)  
chromium(III) oxide: (Cation conc. entered: 42.2 mg/kg, converted to compound conc.:58.241 mg/kg or 0.00582%)  
cobalt sulfate: (Cation conc. entered: 3.6 mg/kg, converted to compound conc.:8.941 mg/kg or 0.000894%, Note 1 conc.: 0.00034%)  
copper sulphate: (Cation conc. entered: 7 mg/kg, converted to compound conc.:16.602 mg/kg or 0.00166%)  
lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: 85 mg/kg, converted to compound conc.:80.264 mg/kg or 0.00803%, Note 1 conc.: 0.00803%)  
mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.128 mg/kg or <0.0000128%)  
**IGNORED Because: "<LOD"**  
molybdenum(VI) oxide: (Cation conc. entered: 2.3 mg/kg, converted to compound conc.:3.258 mg/kg or 0.000326%)  
nickel(II) oxide (nickel monoxide): (Cation conc. entered: 11.2 mg/kg, converted to compound conc.:13.459 mg/kg or 0.00135%)  
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: 1 mg/kg, converted to compound conc.:2.411 mg/kg or 0.000241%)  
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 18 mg/kg, converted to compound conc.:30.343 mg/kg or 0.00303%)  
zinc oxide: (Cation conc. entered: 123 mg/kg, converted to compound conc.:144.57 mg/kg or 0.0145%)  
TPH (C6 to C40) petroleum group: (Whole conc. entered as: <52 mg/kg or <0.00491%) **IGNORED Because: "<LOD"**  
benzene: (Whole conc. entered as: <0.005 mg/kg or <0.00000472%) **IGNORED Because: "<LOD"**  
toluene: (Whole conc. entered as: <0.005 mg/kg or <0.00000472%) **IGNORED Because: "<LOD"**  
ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.00000472%) **IGNORED Because: "<LOD"**  
xylene: (Whole conc. entered as: <0.005 mg/kg or <0.00000472%) **IGNORED Because: "<LOD"**  
naphthalene: (Whole conc. entered as: <0.04 mg/kg or <0.00000378%) **IGNORED Because: "<LOD"**  
acenaphthylene: (Whole conc. entered as: <0.03 mg/kg or <0.00000283%) **IGNORED Because: "<LOD"**  
acenaphthene: (Whole conc. entered as: <0.05 mg/kg or <0.00000472%) **IGNORED Because: "<LOD"**  
fluorene: (Whole conc. entered as: <0.04 mg/kg or <0.00000378%) **IGNORED Because: "<LOD"**  
phenanthrene: (Whole conc. entered as: <0.03 mg/kg or <0.00000283%) **IGNORED Because: "<LOD"**  
anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.00000378%) **IGNORED Because: "<LOD"**  
fluoranthene: (Whole conc. entered as: 0.05 mg/kg or 0.00000472%)  
pyrene: (Whole conc. entered as: 0.05 mg/kg or 0.00000472%)  
benzo[a]anthracene: (Whole conc. entered as: 0.07 mg/kg or 0.00000661%)



chrysene: (Whole conc. entered as: 0.04 mg/kg or 0.00000378%)  
benzo[b]fluoranthene: (Whole conc. entered as: <0.07 mg/kg or <0.00000661%) **IGNORED Because: "<LOD"**  
benzo[k]fluoranthene: (Whole conc. entered as: <0.07 mg/kg or <0.00000661%) **IGNORED Because: "<LOD"**  
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: <0.04 mg/kg or <0.00000378%) **IGNORED Because: "<LOD"**  
indeno[123-cd]pyrene: (Whole conc. entered as: <0.04 mg/kg or <0.00000378%) **IGNORED Because: "<LOD"**  
dibenz[a,h]anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.00000378%) **IGNORED Because: "<LOD"**  
benzo[ghi]perylene: (Whole conc. entered as: <0.04 mg/kg or <0.00000378%) **IGNORED Because: "<LOD"**  
phenol: (Whole conc. entered as: <0.01 mg/kg or <0.000000944%) **IGNORED Because: "<LOD"**  
1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**  
1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.000000567%) **IGNORED Because: "<LOD"**  
1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.000000567%) **IGNORED Because: "<LOD"**  
bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <0.1 mg/kg or <0.00000944%) **IGNORED Because: "<LOD"**  
bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.000000189%) **IGNORED Because: "<LOD"**  
bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**  
carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.000000378%) **IGNORED Because: "<LOD"**  
styrene: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**  
trichloroethene (TCE): (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**  
vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.000000189%) **IGNORED Because: "<LOD"**  
chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.000000283%) **IGNORED Because: "<LOD"**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cadmium oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "copper sulphate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "pyrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentoxide; vanadium pentoxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"

**Note 1** , used on:

Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"  
Test: "HP 6 on Acute Tox. 4; H332" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "cobalt sulfate"  
Test: "HP 7 on Carc. 2; H351" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 10 on Repr. 2; H361, Repr. 2; H361d, Repr. 2; H361f, Repr. 2; H361fd" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

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Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"

Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

### Determinand notes

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**Note 1** , used on:

determinand: "cobalt sulfate"

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**Note A** , used on:

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

determinand: "selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex"

**Classification of sample: BH2A**

✔ **Non Hazardous Waste**  
Classified as **17 05 04**  
in the List of Waste

**Sample details**

<p>Sample Name: <b>BH2A</b></p> <p>Sample Depth: <b>1 m</b></p> <p>Moisture content: <b>0%</b> (dry weight correction)</p>	<p>LoW Code: Chapter:     <b>17: Construction and Demolition Wastes (including excavated soil from contaminated sites)</b></p> <p>Entry:       <b>17 05 04 (Soil and stones other than those mentioned in 17 05 03)</b></p>
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**Hazard properties**

None identified

**Determinands** (Moisture content: 0%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 8 mg/kg, converted to compound conc.:10.563 mg/kg or 0.00106%)  
barium sulfate: (Cation conc. entered: 162 mg/kg, converted to compound conc.:275.322 mg/kg or 0.0275%)  
beryllium oxide: (Cation conc. entered: 1.3 mg/kg, converted to compound conc.:3.608 mg/kg or 0.000361%)  
diboron trioxide; boric oxide: (Cation conc. entered: 1.6 mg/kg, converted to compound conc.:5.152 mg/kg or 0.000515%)  
cadmium oxide: (Cation conc. entered: 0.2 mg/kg, converted to compound conc.:0.228 mg/kg or 0.0000228%)  
chromium(III) oxide: (Cation conc. entered: 37.5 mg/kg, converted to compound conc.:54.808 mg/kg or 0.00548%)  
cobalt sulfate: (Cation conc. entered: 7.2 mg/kg, converted to compound conc.:18.936 mg/kg or 0.00189%, Note 1 conc.: 0.00072%)  
copper sulphate: (Cation conc. entered: 24 mg/kg, converted to compound conc.:60.281 mg/kg or 0.00603%)  
lead compounds with the exception of those specified elsewhere in this Annex: (Cation conc. entered: 133 mg/kg, converted to compound conc.:133 mg/kg or 0.0133%, Note 1 conc.: 0.0133%)  
mercury dichloride: (Cation conc. entered: <0.1 mg/kg, converted to compound conc.:<0.135 mg/kg or <0.0000135%)  
**IGNORED Because: "<LOD"**  
molybdenum(VI) oxide: (Cation conc. entered: 2.4 mg/kg, converted to compound conc.:3.6 mg/kg or 0.00036%)  
nickel(II) oxide (nickel monoxide): (Cation conc. entered: 24.8 mg/kg, converted to compound conc.:31.56 mg/kg or 0.00316%)  
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: <1 mg/kg, converted to compound conc.:<2.554 mg/kg or <0.000255%) **IGNORED Because: "<LOD"**  
divanadium pentaoxide; vanadium pentoxide: (Cation conc. entered: 47 mg/kg, converted to compound conc.:83.904 mg/kg or 0.00839%)  
zinc oxide: (Cation conc. entered: 128 mg/kg, converted to compound conc.:159.323 mg/kg or 0.0159%)  
TPH (C6 to C40) petroleum group: (Whole conc. entered as: 821 mg/kg or 0.0821%)  
benzene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
toluene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
ethylbenzene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
xylylene: (Whole conc. entered as: <0.005 mg/kg or <0.0000005%) **IGNORED Because: "<LOD"**  
naphthalene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
acenaphthylene: (Whole conc. entered as: <0.03 mg/kg or <0.000003%) **IGNORED Because: "<LOD"**  
acenaphthene: (Whole conc. entered as: <0.05 mg/kg or <0.000005%) **IGNORED Because: "<LOD"**  
fluorene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
phenanthrene: (Whole conc. entered as: 0.47 mg/kg or 0.000047%)  
anthracene: (Whole conc. entered as: 0.1 mg/kg or 0.00001%)  
fluoranthene: (Whole conc. entered as: 0.64 mg/kg or 0.000064%)  
pyrene: (Whole conc. entered as: 0.52 mg/kg or 0.000052%)  
benzo[a]anthracene: (Whole conc. entered as: 0.33 mg/kg or 0.000033%)

chrysene: (Whole conc. entered as: 0.27 mg/kg or 0.000027%)  
benzo[b]fluoranthene: (Whole conc. entered as: 0.4 mg/kg or 0.00004%)  
benzo[k]fluoranthene: (Whole conc. entered as: 0.4 mg/kg or 0.00004%)  
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.22 mg/kg or 0.000022%)  
indeno[123-cd]pyrene: (Whole conc. entered as: 0.16 mg/kg or 0.000016%)  
dibenz[a,h]anthracene: (Whole conc. entered as: <0.04 mg/kg or <0.000004%) **IGNORED Because: "<LOD"**  
benzo[ghi]perylene: (Whole conc. entered as: 0.13 mg/kg or 0.000013%)  
phenol: (Whole conc. entered as: <0.01 mg/kg or <0.000001%) **IGNORED Because: "<LOD"**  
1,1,2,2-tetrachloroethane: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
1,2,4-trimethylbenzene: (Whole conc. entered as: <0.006 mg/kg or <0.0000006%) **IGNORED Because: "<LOD"**  
1,2-dichloropropane; propylene dichloride: (Whole conc. entered as: <0.006 mg/kg or <0.0000006%) **IGNORED Because: "<LOD"**  
bis(2-ethylhexyl) phthalate; di-(2-ethylhexyl) phthalate; DEHP: (Whole conc. entered as: <0.1 mg/kg or <0.00001%) **IGNORED Because: "<LOD"**  
bromobenzene: (Whole conc. entered as: <0.002 mg/kg or <0.0000002%) **IGNORED Because: "<LOD"**  
bromoform; tribromomethane: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
carbon tetrachloride; tetrachloromethane: (Whole conc. entered as: <0.004 mg/kg or <0.0000004%) **IGNORED Because: "<LOD"**  
styrene: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
trichloroethene (TCE): (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**  
vinyl chloride: (Whole conc. entered as: <0.002 mg/kg or <0.0000002%) **IGNORED Because: "<LOD"**  
chlorobenzene: (Whole conc. entered as: <0.003 mg/kg or <0.0000003%) **IGNORED Because: "<LOD"**

## Test Settings

HP 3(i) on Flam. Liq. 1; H224, Flam. Liq. 2; H225, Flam. Liq. 3; H226: **Force this Hazardous property to non hazardous because: "Non hazardous by HP 3(i). Appendix C of WM3 v1. Figure C3.1. The Waste is not a liquid and does not have a free draining liquid phase. Furthermore carbon banding of the TPH indicates negligible concentrations of short chain carbon fractions. "**

## Notes utilised in assessment

### C14: Step 5

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "arsenic trioxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cadmium oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chromium(III) oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "copper sulphate"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "zinc oxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "phenanthrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "pyrene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]anthracene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[b]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[k]fluoranthene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "benzo[ghi]perylene"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "divanadium pentoxide; vanadium pentoxide"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "TPH (C6 to C40) petroleum group"  
Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "nickel(II) oxide (nickel monoxide)"

**Note 1** , used on:

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Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cobalt sulfate"

Test: "HP 6 on Acute Tox. 4; H332" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 7 on Carc. 1A; H350, Carc. 1B; H350, Carc. 1A; H350i, Carc. 1B; H350i" for determinand: "cobalt sulfate"

Test: "HP 7 on Carc. 2; H351" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360D, Repr. 1A; H360Df, Repr. 1A; H360F, Repr. 1A; H360Fd, Repr. 1A; H360FD, Repr. 1B; H360, Repr. 1B; H360D, Repr. 1B; H360Df, Repr. 1B; H360F, Repr. 1B; H360Fd, Repr. 1B; H360FD" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 10 on Repr. 2; H361, Repr. 2; H361d, Repr. 2; H361f, Repr. 2; H361fd" for determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

Test: "HP 11 on Muta. 2; H341" for determinand: "cobalt sulfate"

Test: "HP 13 on Skin Sens. 1; H317, Skin Sens. 1A; H317, Skin Sens. 1B; H317, Resp. Sens. 1; H334, Resp. Sens. 1A; H334, Resp. Sens. 1B; H334" for determinand: "cobalt sulfate"

Test: "HP 14 on R50, R50/53, R51/53, R52/53, R52, R53" for determinand: "cobalt sulfate"

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## Determinand notes

**Note 1** , used on:

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determinand: "cobalt sulfate"

determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**Note A** , used on:

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determinand: "lead compounds with the exception of those specified elsewhere in this Annex"

**WM3: Unknown oil** , used on:

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determinand: "TPH (C6 to C40) petroleum group"

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## Appendix A: Classifier defined and non CLP determinands

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### **barium sulfate** (CAS Number: 7727-43-7)

Conversion factor: 1.7

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R20/22, R33, R36/37/38

Hazard Statements: Acute Tox. 4; H332, Acute Tox. 4; H302, STOT RE 2; H373, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315

### **chromium(III) oxide** (CAS Number: 1308-38-9)

Conversion factor: 1.462

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R20, R22, R36, R37, R38, R42, R43, R50/53, R60, R61

Hazard Statements: Acute Tox. 4; H332, Acute Tox. 4; H302, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Resp. Sens. 1; H334, Skin Sens. 1; H317, Repr. 1B; H360FD, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

### **lead compounds with the exception of those specified elsewhere in this Annex**

CLP index number: 082-001-00-6

Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)

Additional Risk Phrases: None.

Additional Hazard Statement(s): Carc. 2; H351

Reason:

03/06/2015 - Carc. 2; H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium [www.reach-lead.eu/substanceinformation.html](http://www.reach-lead.eu/substanceinformation.html). Review date 29/09/2015

### **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013

Data source: WM3 1st Edition 2015

Data source date: 25/05/2015

Risk Phrases: R10, R45, R46, R51/53, R63, R65

Hazard Statements: Flam. Liq. 3; H226, Asp. Tox. 1; H304, STOT RE 2; H373, Muta. 1B; H340, Carc. 1B; H350, Repr. 2; H361d, Aquatic Chronic 2; H411

### **ethylbenzene** (CAS Number: 100-41-4)

CLP index number: 601-023-00-4

Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)

Additional Risk Phrases: None.

Additional Hazard Statement(s): Carc. 2; H351

Reason:

03/06/2015 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

### **acenaphthylene** (CAS Number: 208-96-8)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R22, R26, R27, R36, R37, R38

Hazard Statements: Acute Tox. 4; H302, Acute Tox. 1; H330, Acute Tox. 1; H310, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315

### **acenaphthene** (CAS Number: 83-32-9)

Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R36, R37, R38, N; R50/53, N; R51/53

Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Aquatic Chronic 2; H411

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**fluorene** (CAS Number: 86-73-7)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: N; R50/53

Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

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**phenanthrene** (CAS Number: 85-01-8)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: R22, R36, R37, R38, R40, R43, N; R50/53

Hazard Statements: Acute Tox. 4; H302, Eye Irrit. 2; H319, STOT SE 3; H335, Carc. 2; H351, Skin Sens. 1; H317,

Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Skin Irrit. 2; H315

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**anthracene** (CAS Number: 120-12-7)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17/07/2015

Risk Phrases: R36, R37, R38, R43, N; R50/53

Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Skin Sens. 1; H317, Aquatic Acute 1; H400,

Aquatic Chronic 1; H410

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**fluoranthene** (CAS Number: 206-44-0)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21/08/2015

Risk Phrases: Xn; R22, N; R50/53

Hazard Statements: Acute Tox. 4; H302, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

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**pyrene** (CAS Number: 129-00-0)

Comments: Data from C&amp;L Inventory Database; SDS Sigma Aldrich 2014

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21/08/2015

Risk Phrases: Xi; R36/37/38, N; R50/53

Hazard Statements: Skin Irrit. 2; H315, Eye Irrit. 2; H319, STOT SE 3; H335, Aquatic Acute 1; H400, Aquatic Chronic 1;

H410

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**indeno[123-cd]pyrene** (CAS Number: 193-39-5)

Comments: Data from C&amp;L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06/08/2015

Risk Phrases: R40

Hazard Statements: Carc. 2; H351

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**benzo[ghi]perylene** (CAS Number: 191-24-2)

Comments: Data from C&amp;L Inventory Database; SDS Sigma Aldrich 28/02/2015

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 23/07/2015

Risk Phrases: N; R50/53

Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

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**chlorobenzene** (CAS Number: 108-90-7)

CLP index number: 602-033-00-1

Data source: Regulation (EU) 2016/1179 of 19 July 2016 (ATP9)

Additional Risk Phrases: N; R51/53

Additional Hazard Statement(s): None.

Reason:

10/10/2016 - N; R51/53 hazard statement sourced from: WM3 v1 still uses ecotoxic risk phrases

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**polychlorobiphenyls; PCB** (CAS Number: 1336-36-3)

CLP index number: 602-039-00-4

Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)

Additional Risk Phrases: None.

Additional Hazard Statement(s): Carc. 1A; H350

Reason:

29/09/2015 - Carc. 1A; H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

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**coronene** (CAS Number: 191-07-1)

Comments: Data from C&L Inventory Database; no entries in Registered Substances or Pesticides Properties databases; SDS: Sigma Aldrich, 1907/2006 compliant, dated 2012 - no entries; IARC – Group 3, not carcinogenic.

Data source:

<http://clp->

[inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=17010&HarmOnly=no?fc=true&lang=en](http://inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=17010&HarmOnly=no?fc=true&lang=en)

Data source date: 16/06/2014

Risk Phrases: R68/20

Hazard Statements: STOT SE 2; H371

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**confirm TPH has NOT arisen from diesel or petrol**

Comments: Chapter 3, section 4b requires a positive confirmation for benzo[a]pyrene to be used as a marker in evaluating Carc. 1B; H350 (HP 7) and Muta. 1B; H340 (HP 11)

Data source: WM3 1st Edition 2015

Data source date: 25/05/2015

Risk Phrases: None.

Hazard Statements: None.

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**Appendix B: Rationale for selection of metal species**

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**C14: Step 5**

from section: WM3: C14 in the document: "[WM3 - Waste Classification](#)"

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..."

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**Note 1**

from section: 1.1.3.2, Annex VI in the document: "[CLP Regulation](#)"

"The concentration stated or, in the absence of such concentrations, the generic concentrations of this Regulation (Table 3.1) or the generic concentrations of Directive 1999/45/EC (Table 3.2), are the percentages by weight of the metallic element calculated with reference to the total weight of the mixture."

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**Note A**

from section: 1.1.3.1, Annex VI in the document: "[CLP Regulation](#)"

"Without prejudice to Article 17(2), the name of the substance must appear on the label in the form of one of the designations given in Part 3. In Part 3, use is sometimes made of a general description such as '... compounds' or '... salts'. In this case, the supplier is required to state on the label the correct name, due account being taken of section 1.1.1.4."

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**WM3: Unknown oil**

from section: Chapter 3: 4. Waste oils and other wastes containing or contaminated with oil in the document: "[WM3 - Waste Classification](#)"

"If the identity of the oil is unknown, and the petroleum group cannot be established, then the oil contaminating the waste can be classified as non-carcinogenic due to the presence of oil if all three of the following criteria are met:

- the waste contains **benzo[a]pyrene (BaP)** at a concentration of less than 0.01% (1/10,000th) of the TPH concentration (This is the carcinogenic limit specified in table 3.2 of the CLP for BaP)
- this has been determined by an appropriate and representative sampling approach in accordance with the principles set out in Appendix D, and
- the analysis clearly demonstrates, for example by carbon bands or chromatograph, and the laboratory has reasonably concluded that the hydrocarbons present have not arisen from petrol or diesel

"



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## Appendix C: Version

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This classification utilises the following guidance and legislation:

- WM3 - Waste Classification - May 2015
- CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
- 1st ATP - Regulation 790/2009/EC of 10 August 2009
- 2nd ATP - Regulation 286/2011/EC of 10 March 2011
- 3rd ATP - Regulation 618/2012/EU of 10 July 2012
- 4th ATP - Regulation 487/2013/EU of 8 May 2013
- Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
- 5th ATP - Regulation 944/2013/EU of 2 October 2013
- 6th ATP - Regulation 605/2014/EU of 5 June 2014
- WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
- Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
- 7th ATP - Regulation 2015/1221/EU of 24 July 2015
- 8th ATP - Regulation (EU) 2016/918 of 19 May 2016
- 9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
- POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
- 1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
- 2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

HazWasteOnline Classification Engine: WM3 1st Edition, May 2015

HazWasteOnline Classification Engine Version: 2016.317.3166.6295 (12 Nov 2016)

HazWasteOnline Database: 2016.315.3165.6292 (10 Nov 2016)

## Appendix H Risk Rating Matrix

Table H.1: Risk rating for contaminated land qualitative risk assessment

Level of Severity	Likelihood		
	Most Likely	Reasonably Foreseeable	Unlikely
Acute harm or severe chronic harm. Direct pollution of sensitive water receptors or serious pollution of other water bodies.	High	High	Low
Harm from long-term exposure. Slight pollution of sensitive receptors or pollution of other water bodies.	Medium	Medium	Low
No significant harm in either short or long term. No pollution of water that is likely to affect sensitive receptors. No more than slight pollution of other water bodies.	Low	Low	Low

## Appendix I Environmental Receptors

The Contaminated Land Statutory Guidance has a four category system that considers harm to human health, controlled waters, flora and fauna, property, livestock and crops. The Categories are broadly defined as follows:

- 1 Contaminated Land – similar to land where it is known that significant harm has been caused or significant harm is being caused
- 2 Contaminated Land – no significant harm being caused but there is a significant possibility for significant harm to be caused in the future
- 3 Not Contaminated Land – there may be harm being caused but no significant possibility for significant harm to be caused in the future
- 4 Not Contaminated Land – no pollutant linkage, normal levels of contaminants and no significant harm being caused and no significant possibility for significant harm to be caused in the future.

Table I.1: Significant pollution to controlled waters

### **Pollution of controlled waters**

Under Section 78A(9) of Part 2A the term “pollution of controlled waters means the entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter. The term “controlled waters” in relation to England has the same meaning as in Part 3 of the Water Resources Act 1991, except that “ground waters” does not include water contained in underground strata but above the saturation zones. (Paragraph 4.36)

Given that the Part 2A regime seeks to identify and deal with significant pollution (rather than lesser levels of pollution), the local authority should seek to focus on pollution which: (i) may be harmful to human health or the quality of aquatic ecosystems or terrestrial ecosystems directly depending on aquatic ecosystems; (ii) which may result in damage to material property; or (iii) which may impair or interfere with amenities and other legitimate uses of the environment. (Paragraph 4.37)

### **Significant pollution of controlled waters**

Paragraph 4.38 states that “The following types of pollution should be considered to constitute significant pollution of controlled waters:

- (a) Pollution equivalent to “environmental damage” to surface water or groundwater as defined by The Environmental Damage (Prevention and Remediation) Regulations 2009, but which cannot be dealt with under those Regulations.
- (b) Inputs resulting in deterioration of the quality of water abstracted, or intended to be used in the future, for human consumption such that additional treatment would be required to enable that use.
- (c) A breach of a statutory surface water Environment Quality Standard, either directly or via a groundwater pathway.
- (d) Input of a substance into groundwater resulting in a significant and sustained upward trend in concentration of contaminants (as defined in Article 2(3) of the Groundwater Daughter Directive (2006/118/EC)5”.

Paragraph 4.39 states that “In some circumstances, the local authority may consider that the following types of pollution may constitute significant pollution: (a) significant concentrations<sup>6</sup> of hazardous substances or non-hazardous pollutants in groundwater; or (b) significant concentrations of priority hazardous substances, priority substances or other specific polluting substances in surface water; at an appropriate, risk based compliance point. The local authority should only conclude that pollution is significant if it considers that treating the land as contaminated land would be in accordance with the broad objectives of the regime as described in Section 1 (of the Contaminated Land Statutory Guidance). This would normally mean that the authority should conclude that less serious forms of pollution are not significant. In such cases the authority should consult the Environment Agency”.

The following types of circumstance should not be considered to be contaminated land on water pollution grounds:

- (a) The fact that substances are merely entering water and none of the conditions for considering that significant pollution is being caused set out in paragraphs 4.38 and 4.39 above are being met.
- (b) The fact that land is causing a discharge that is not discernible at a location immediately downstream or down-gradient of the land (when compared to upstream or up-gradient concentrations).
- (c) Substances entering water in compliance with a discharge authorised under the Environmental Permitting Regulations.

#### **Significant pollution of controlled waters is being caused**

In deciding whether significant pollution of controlled waters is being caused, the local authority should consider that this test is only met where it is satisfied that the substances in question are continuing to enter controlled waters; or that they have already entered the waters and are likely to do so again in such a manner that past and likely future entry in effect constitutes ongoing pollution. For these purposes, the local authority should:

- (a) Regard substances as having entered controlled waters where they are dissolved or suspended in those waters, or (if they are immiscible with water) they have direct contact with those waters on or beneath the surface of the water.
- (b) Take the term “continuing to enter” to mean any measurable entry of the substance(s) into controlled waters additional to any which has already occurred.
- (c) Take the term “likely to do so again” to mean more likely than not to occur again.

Land should not be determined as contaminated land on grounds that significant pollution of controlled waters is being caused where: (a) the relevant substance(s) are already present in controlled waters; (b) entry into controlled waters of the substance(s) from land has ceased; and (c) it is not likely that further entry will take place.

#### **Significant Possibility of Significant Pollution of Controlled Waters**

In deciding whether or not a significant possibility of significant pollution of controlled waters exists, the local authority should first understand the possibility of significant pollution of controlled waters posed by the land, and the levels of certainty/uncertainty attached to that understanding, before it goes on to decide whether or not that possibility is significant. The term “possibility of significant pollution of controlled waters” means the estimated likelihood that significant pollution of controlled waters might occur. In assessing the possibility of significant pollution of controlled waters from land, the local authority should act in accordance with the advice on risk assessment in Section 3 and the guidance in this sub-section.

In deciding whether the possibility of significant pollution of controlled waters is significant the local authority should bear in mind that Part 2A makes the decision a positive legal test. In other words, for particular land to meet the test the authority needs reasonably to believe that there is a significant possibility of such pollution, rather than to demonstrate that there is not.

Before making its decision on whether a given possibility of significant pollution of controlled waters is significant, the local authority should consider:

- (a) The estimated likelihood that the potential significant pollution of controlled waters would become manifest; the strength of evidence underlying the estimate; and the level of uncertainty underlying the estimate.
- (b) The estimated impact of the potential significant pollution if it did occur. This should include consideration of whether the pollution would be likely to cause a breach of European water legislation, or make a major contribution to such a breach.
- (c) The estimated timescale over which the significant pollution might become manifest.
- (d) The authority's initial estimate of whether remediation is feasible, and if so what it would involve and the extent to which it might provide a solution to the problem; how long it would take; what benefit it would be likely to bring; and whether the benefits would outweigh the costs and any impacts on local society or the environment from taking action

Reproduced from DEFRA (2012) Contaminated Land Statutory Guidance pursuant to section 78YA of the Environmental Protection Act 1990 as amended by Section 57 of the Environment Act 1995.

**Table I.2: Significant harm to human health, ecological systems and property**

Relevant types of receptor	Significant harm	Significant possibility of significant harm
Human beings	<p>The following health effects should always be considered to constitute significant harm to human health: death; life threatening diseases (eg cancers); other diseases likely to have serious impacts on health; serious injury; birth defects; and impairment of reproductive functions.</p> <p>Other health effects may be considered by the local authority to constitute significant harm. For example, a wide range of conditions may or may not constitute significant harm (alone or in combination) including: physical injury; gastrointestinal disturbances; respiratory tract effects; cardio-vascular effects; central nervous system effects; skin ailments; effects on organs such as the liver or kidneys; or a wide range of other health impacts. In deciding whether or not a particular form of harm is significant harm, the local authority should consider the seriousness of the</p>	<p>The risk posed by one or more relevant contaminant linkage(s) relating to the land comprises:</p> <ul style="list-style-type: none"> <li>(a) The estimated likelihood that significant harm might occur to an identified receptor, taking account of the current use of the land in question.</li> <li>(b) The estimated impact if the significant harm did occur – i.e. the nature of the harm, the seriousness of the harm to any person who might suffer it, and (where relevant) the extent of the harm in terms of how many people might suffer it.</li> </ul> <p>In estimating the likelihood that a specific form of significant harm might occur the local authority should, among other things, consider:</p> <ul style="list-style-type: none"> <li>(a) The estimated probability that</li> </ul>

Relevant types of receptor	Significant harm	Significant possibility of significant harm
	<p>harm in question: including the impact on the health, and quality of life, of any person suffering the harm; and the scale of the harm. The authority should only conclude that harm is significant if it considers that treating the land as contaminated land would be in accordance with the broad objectives of the regime as described in Section 1 of the Contaminated Land Statutory Guidance.</p>	<p>the significant harm might occur:</p> <p>(i) if the land continues to be used as it is currently being used; and</p> <p>(ii) where relevant, if the land were to be used in a different way (or ways) in the future having regard to the guidance on “current use” in Section 3 of the Contaminated Land Statutory Guidance.</p> <p>(b) The strength of evidence underlying the risk estimate. It should also consider the key assumptions on which the estimate of likelihood is based, and the level of uncertainty underlying the estimate.</p>
<p>Any ecological system, or living organism forming part of such a system, within a location which is:</p> <ul style="list-style-type: none"> <li>• a site of special scientific interest (under section 28 of the Wildlife and Countryside Act (WCA) 1981 (as amended) and Part 4 of the Natural Environment and Rural Communities Act 2006 (as amended));</li> <li>• a national nature reserve (under Section 35 of the WCA 1981 (as amended));</li> <li>• a marine nature reserve (under Section 36 of the WCA 1981 (as amended));</li> <li>• an area of special protection for birds (under Section 3 of the WCA 1981 (as amended));</li> <li>• a “European site” within the meaning of regulation 8 of the Conservation of Habitats and Species Regulations 2010 (as amended);</li> <li>• any habitat or site afforded policy protection under Section 11 of The National Planning Policy Framework (NPPF) on conserving and enhancing the natural environment (i.e. possible Special Areas of Conservation, potential Special</li> </ul>	<p>The following types of harm should be considered to be significant harm:</p> <ul style="list-style-type: none"> <li>• harm which results in an irreversible adverse change, or in some other substantial adverse change, in the functioning of the ecological system within any substantial part of that location; or</li> <li>• harm which significantly affects any species of special interest within that location and which endangers the long-term maintenance of the population of that species at that location.</li> </ul> <p>In the case of European sites, harm should also be considered to be significant harm if it endangers the favourable conservation status of natural habitats at such locations or species typically found there. In deciding what constitutes such harm, the local authority should have regard to the advice of Natural England and to the requirements of the Conservation of Habitats and Species Regulations 2010 (as amended).</p>	<p>Conditions would exist for considering that a significant possibility of significant harm exists to a relevant ecological receptor where the local authority considers that:</p> <ul style="list-style-type: none"> <li>• significant harm of that description is more likely than not to result from the contaminant linkage in question; or</li> <li>• there is a reasonable possibility of significant harm of that description being caused, and if that harm were to occur, it would result in such a degree of damage to features of special interest at the location in question that they would be beyond any practicable possibility of restoration.</li> </ul> <p>Any assessment made for these purposes should take into account relevant information for that type of contaminant linkage, particularly in relation to the ecotoxicological effects of the contaminant.</p>

Relevant types of receptor	Significant harm	Significant possibility of significant harm
<p>Protection Areas and listed or proposed Ramsar sites); or</p> <ul style="list-style-type: none"> <li>any nature reserve established under Section 21 of the National Parks and Access to the Countryside Act 1949.</li> </ul>		
<p>Property in the form of:</p> <ul style="list-style-type: none"> <li>crops, including timber</li> <li>produce grown domestically, or on allotments, for consumption</li> <li>livestock</li> <li>other owned or domesticated animals;</li> <li>wild animals which are the subject of shooting or fishing rights.</li> </ul>	<p>For crops, a substantial diminution in yield or other substantial loss in their value resulting from death, disease or other physical damage. For domestic pets, death, serious disease or serious physical damage. For other property in this category, a substantial loss in its value resulting from death, disease or other serious physical damage.</p> <p>The local authority should regard a substantial loss in value as occurring only when a substantial proportion of the animals or crops are dead or otherwise no longer fit for their intended purpose. Food should be regarded as being no longer fit for purpose when it fails to comply with the provisions of the Food Safety Act 1990. Where a diminution in yield or loss in value is caused by a pollutant linkage, a 20% diminution or loss should be regarded as a benchmark for what constitutes a substantial diminution or loss. In the Guidance states that this description of significant harm is referred to as an "animal or crop effect".</p>	<p>Conditions would exist for considering that a significant possibility of significant harm exists to the relevant types of receptor where the local authority considers that significant harm is more likely than not to result from the contaminant linkage in question, taking into account relevant information for that type of contaminant linkage, particularly in relation to the ecotoxicological effects of the contaminant.</p>
<p>Property in the form of buildings. For this purpose 'building' means any structure or erection and any part of a building, including any part below ground level, but does not include plant or machinery comprised in a building, or buried services such as sewers, water pipes or electricity cables.</p>	<p>Structural failure, substantial damage or substantial interference with any right of occupation. The local authority should regard substantial damage or substantial interference as occurring when any part of the building ceases to be capable of being used for the purpose for which it is or was intended.</p> <p>In the case of a scheduled Ancient Monument, substantial damage should be regarded as occurring when the damage significantly impairs the historic, architectural, traditional, artistic or archaeological interest by reason of which the monument was scheduled.</p>	<p>Conditions would exist for considering that a significant possibility of significant harm exists to the relevant types of receptor where the local authority considers that significant harm is more likely than not to result from the contaminant linkage in question during the expected economic life of the building (or in the case of a scheduled Ancient Monument the foreseeable future), taking into account relevant information for that type of contaminant linkage.</p>

Relevant types of receptor	Significant harm	Significant possibility of significant harm
	The Guidance states that this description of significant harm is referred to as a 'building effect'.	

Reproduced from DEFRA (2012) Contaminated Land Statutory Guidance pursuant to section 78YA of the Environmental Protection Act 1990 as amended by Section 57 of the Environment Act 1995.



## **Appendix J                    Generic Assessment Criteria**

### **Human Health Generic Assessment Criteria**

#### **Background**

In order to be able to make inference on whether the results obtained during the site investigation (e.g. chemical concentrations in soils, waters and gas) point to the presence of a potential hazard to human health, it is necessary to distinguish between the results, reflecting background and/or insignificantly elevated levels of contamination (i.e. with negligible potential to cause harm or pollution) and the results with significantly elevated concentrations (i.e. with significant potential to cause harm or pollution).

The approach to risk assessment with respect to risks to human health from contaminated land in the UK is set out in the publication Model Procedures for the Management of Land Contamination (CLR11) Environment Agency (2004).

This sets out a tiered approach:

- Preliminary Risk Assessment (e.g. establishing potential pollutant linkages);
- Generic Quantitative Risk Assessment (GQRA) (e.g. comparison of site contaminant concentrations against generic standards and compliance criteria e.g. Soil Guideline Values (SGV) or other Generic Assessment Criteria including an assessment of risk using the source pathway target model); and
- Detailed Quantitative Risk Assessment (DQRA) (e.g. the comparison of contaminant concentrations against site specific assessment criteria).

#### **Preliminary Risk Assessment**

This typically encompasses a desk based generation of a conceptual model to establish the potential pollutant linkages associated with the site and any proposed development. Works would typically involve:

- Evaluation of the potential sources of contamination on the site and in the locality and from both a current and historical perspective
- Statutory Consultation;
- Evaluation of a sites geology, hydrology and hydrogeology;
- Site inspection;
- Additional pertinent information as necessary on a site by site basis.

Where works indicate the presence of a potential pollutant linkage further evaluation and potentially site investigation works are necessary to determine the significance of the linkage.

#### **Generic Quantitative Risk Assessment (GQRA)**

In August 2008 the Environment Agency (EA) and Department of Environment Food and Rural Affairs (DEFRA) announced the withdrawal of the Contaminated Land Reports CLR7 – 10, CLEA UK (beta) and existing SGV reports as they no-longer fully reflected the revised approach to human health risk assessment.

New partial guidance (in particular Science Reports SR2, SR3 and SR7) and new risk assessment tools (CLEA model version v1.04, v1.05 and currently v1.06) were published in 2009 and these allow environmental practitioners to derive generic and site specific Soil Assessment Criteria (GAC and SAC).

### *Soil Guideline Values (SGVs)*

The EA and DEFRA updated the TOX reports and Soil Guideline Values (SGVs) to reflect the guidance documents published in 2009. SGVs for arsenic, cadmium, nickel, mercury, selenium, BTEX compounds (benzene, toluene, ethylbenzene and xylenes), dioxins, furans and dioxin like PCBs and phenol have been made available.

Since publishing the revised SGVs the CLEA model was updated to version v1.06. The Environment Agency has however confirmed that v1.05 has only a “minor effect on assessment criteria calculated using the CLEA software 1.04” and consequently the GACs derived are considered to remain valid. Environment Agency SGVs generated using v1.04 have also not been updated. Software version v1.06 is identical to v1.05 with some password protection enhancements that in no way affect the GAC values generated.

Owing to the scientific advances since 2009 and in particular toxicological research outputs, less significance is now placed on the SGVs in the hierarchy outlined below.

### *Category 4 Screening Levels (C4SLs)*

Category 4 Screening Levels were generated by Contaminated Land: Applications in Real Environments (CL:AIRE) on behalf of DEFRA and made available to the public in April 2014. Category 4 Screening Levels were derived in response to policy changes outlined in the recently revised Statutory Guidance (SG) for Part 2A of the Environmental Protection Act 1990 (Part 2A). Part 2A was originally introduced to ensure that the risks from land contamination to human health, property and the environment are managed appropriately, with the revised SG being designed to address concerns regarding its real-world application. The revised SG presents a new four category system for classifying land under Part 2A, ranging from Category 4, where the level of risk posed is acceptably low, to Category 1, where the level of risk is clearly unacceptable.

The document SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document (March 2014) states that:

*The Impact Assessment that accompanied the revised Part 2A Statutory Guidance identified a potential role for new ‘Category 4 Screening Levels’ in providing a simple test for deciding when land is suitable for use and definitely not contaminated land. It was envisaged that these new screening levels would allow ‘low-risk’ land to be dismissed from the need for further risk assessment more quickly and easily and allow regulators to focus efforts on the highest-risk land. The C4SLs were proposed to be more pragmatic (whilst still strongly precautionary) compared to existing generic screening levels. It is anticipated that, where they exist, C4SLs will be used as generic screening criteria that can be used within a GQRA, albeit describing a higher level of risk than the currently or previously available SGVs.*

### *Suitable For Use Screening Levels (S4USLs)*

In January 2015, Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH) have published updated screening criteria that were derived in line with UK guidance on risk assessment (SR2 and SR3). The resultant screening criteria reflect the industries greater knowledge of the relevant toxicology and further consideration of exposure scenarios as set out in SP1010.

## **Waterman's Generic Assessment Criteria (GACs)**

Waterman have used the following hierarchy for the generic assessment of soils to evaluate Human Health.

- Published Category 4 Screening Values (C4SLs) derived by CL:AIRE on behalf of DEFRA; or in their absence;
- Suitable 4 Use Screening Levels (S4USLs) derived by LQM/CIEH; or in their absence;
- Published Soil Guideline Values (SGVs);
- GAC prepared in accordance with the CLEA v1.04 / v1.06 model by authoritative bodies (e.g. Contaminated Land Applications in Real Environments (CL:AIRE) 2009; and
- Waterman in-house GAC prepared in accordance with the CLEA V1.06 model and associated documents.

Tabulated values of the GACs used are presented overleaf. The references of the sources quoted in the table are:-

- Environment Agency, 2009. CLEA Software, version 1.06;
- DEFRA, Environment Agency, 2004. Model Procedures for the Management of Land Contamination, Contaminated Land Report 11;
- DEFRA, 2014, SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document and appendices;
- LQM / CIEH, 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment;
- Environment Agency, 2009. Human health toxicological assessment of contaminants in soil. Report SC050021/SR2;
- Environment Agency, 2009. Updated technical background to the CLEA model. Report SC050021/SR3;
- Environment Agency, 2008. Compilation of chemical data for priority organic pollutants for derivation of Soil Guideline Values. Report SC050021/SR7; and
- EIC / CL:AIRE, 2010. Soil generic assessment criteria for human health risk assessment.

## **Detailed Quantitative Risk Assessment (DQRA)**

Detailed Quantitative Risk Assessments are undertaken on a site specific basis and full details of the alterations to the CLEA model and generic land use scenarios will be described within the specific reports.

Table J.1: Generic Quantitative Risk Assessment Criteria - Residential end use without plant uptake, 1% soil organic matter

Determinant	Units	Value	Source
Arsenic	mg/kg	40	DEFRA C4SLs
Beryllium	mg/kg	550	LQM S4ULs 2015
Boron (Water Soluble)	mg/kg	1300	LQM S4ULs 2015
Cadmium	mg/kg	1.7	DEFRA C4SLs
Chromium (Total)	mg/kg	11000	LQM S4ULs 2015
Chromium (VI)	mg/kg	150	DEFRA C4SLs
Copper	mg/kg	910	LQM S4ULs 2015
Lead	mg/kg	21	DEFRA C4SLs
Mercury	mg/kg	7100	LQM S4ULs 2015
Nickel	mg/kg	310	LQM S4ULs 2015
Selenium	mg/kg	1.2	LQM S4ULs 2015
Vanadium*	mg/kg	670	LQM S4ULs 2015
Zinc	mg/kg	180	LQM S4ULs 2015
Cyanide (Free)	mg/kg	430	Waterman GAC - CLEA v1.06
Complex Cyanide	mg/kg	1200	Waterman GAC - CLEA v1.06
Thiocyanate	mg/kg	40000	Waterman GAC - CLEA v1.06
Aliphatic EC5 - EC6	mg/kg		LQM S4ULs 2015
Aliphatic EC6 - EC8	mg/kg		LQM S4ULs 2015
Aliphatic EC8-EC10	mg/kg		LQM S4ULs 2015
Aliphatic EC10-EC12	mg/kg	42	LQM S4ULs 2015
Aliphatic EC12-EC16	mg/kg	100	LQM S4ULs 2015
Aliphatic EC16-EC35	mg/kg	27	LQM S4ULs 2015
Aliphatic EC35-EC44	mg/kg	130	LQM S4ULs 2015
Aromatic C5-C7	mg/kg	1100	LQM S4ULs 2015
Aromatic C7-C8	mg/kg	65000	LQM S4ULs 2015
Aromatic C8-C10	mg/kg	65000	LQM S4ULs 2015
Aromatic C10-C12	mg/kg	370	LQM S4ULs 2015

Determinant	Units	Value	Source
Aromatic C12-C16	mg/kg	860	LQM S4ULs 2015
Aromatic C16-C21	mg/kg	47	LQM S4ULs 2015
Aromatic C21-C35	mg/kg	250	LQM S4ULs 2015
Aromatic C35-C44	mg/kg	1800	LQM S4ULs 2015
Benzene	mg/kg	1900	LQM S4ULs 2015
Toluene	mg/kg	1900	LQM S4ULs 2015
Ethyl Benzene	mg/kg	1900	LQM S4ULs 2015
Xylene - o	mg/kg	0.38	LQM S4ULs 2015
Xylene - m	mg/kg	880	LQM S4ULs 2015
Xylene - p	mg/kg	83	LQM S4ULs 2015
MTBE (Methyl tert-butyl ether)	mg/kg	82	CL:AIRE 2009
Naphthalene	mg/kg	88	LQM S4ULs 2015
Acenaphthylene	mg/kg	79	LQM S4ULs 2015
Acenaphthene	mg/kg		LQM S4ULs 2015
Fluorene	mg/kg	2.3	LQM S4ULs 2015
Phenanthrene	mg/kg	2900	LQM S4ULs 2015
Anthracene	mg/kg	3000	LQM S4ULs 2015
Fluoranthene	mg/kg	2800	LQM S4ULs 2015
Pyrene	mg/kg	1300	LQM S4ULs 2015
Benzo(a)anthracene	mg/kg	31000	LQM S4ULs 2015
Chrysene	mg/kg	1500	LQM S4ULs 2015
Benzo(b)fluoranthene	mg/kg	3700	LQM S4ULs 2015
Benzo(k)fluoranthene	mg/kg	11	LQM S4ULs 2015
Benzo(a)pyrene	mg/kg	30	LQM S4ULs 2015
Indeno(1,2,3-cd)pyrene	mg/kg	3.9	LQM S4ULs 2015
Di-benzo(a.h.)anthracene	mg/kg	110	LQM S4ULs 2015
Benzo(g.h.i.) Perylene	mg/kg	3.2	LQM S4ULs 2015
Phenol	mg/kg	45	LQM S4ULs 2015
Pentachlorophenol (PCP)	mg/kg	0.31	LQM S4ULs 2015
1,1,2,2 Tetrachloroethane	mg/kg	360	LQM S4ULs 2015

Determinant	Units	Value	Source
1,1,1,2 Tetrachloroethane	mg/kg	750	LQM S4ULs 2015
1,1,1 Trichloroethane	mg/kg	27	LQM S4ULs 2015
Trichloroethene	mg/kg	3.9	LQM S4ULs 2015
Tetrachloromethane (Carbon Tetrachloride)	mg/kg	1.5	LQM S4ULs 2015
1,2- Dichloroethane	mg/kg	9	LQM S4ULs 2015
Chloroethene (Vinyl chloride)	mg/kg	0.017	LQM S4ULs 2015
Trichloroethene	mg/kg	0.026	LQM S4ULs 2015
Tetrachloroethene	mg/kg	0.0092	LQM S4ULs 2015
Trichloromethane (Chloroform)	mg/kg	0.00077	LQM S4ULs 2015
Isopropylbenzene	mg/kg	0.017	CL:AIRE 2009
Propylbenzene	mg/kg	0.18	CL:AIRE 2009
Styrene	mg/kg	1.2	CL:AIRE 2009
Bromobenzene	mg/kg		CL:AIRE 2009
1,1,2 Trichloroethane	mg/kg	12	CL:AIRE 2009
1,1-Dichloroethane	mg/kg	40	CL:AIRE 2009
1,1-Dichloroethene	mg/kg	35	CL:AIRE 2009
1,2,4-Trimethylbenzene	mg/kg	0.91	CL:AIRE 2009
1,2-Dichloropropane	mg/kg	0.88	CL:AIRE 2009
2-Chloronaphthalene	mg/kg	2.5	CL:AIRE 2009
Bromodichloromethane	mg/kg	0.23	CL:AIRE 2009
Bromoform	mg/kg	0.41	CL:AIRE 2009
Chloroethane	mg/kg	0.024	CL:AIRE 2009
Chloromethane	mg/kg	3.8	CL:AIRE 2009
Cis 1,2 Dichloroethene	mg/kg	0.019	CL:AIRE 2009
Dichloromethane	mg/kg	5.2	CL:AIRE 2009
Hexachloroethane	mg/kg	8.4	CL:AIRE 2009
Trans 1,2 Dichloroethene	mg/kg	0.0085	CL:AIRE 2009
Bis (2-ethylhexyl) phthalate	mg/kg	0.12	CL:AIRE 2009
Butyl benzyl phthalate	mg/kg	2.1	CL:AIRE 2009
Diethyl Phthalate	mg/kg	0.22	CL:AIRE 2009

<b>Determinant</b>	<b>Units</b>	<b>Value</b>	<b>Source</b>
Di-n-butyl phthalate	mg/kg	0.19	CL:AIRE 2009
Di-n-octyl phthalate	mg/kg	2700	CL:AIRE 2009
Biphenyl	mg/kg	42000	CL:AIRE 2009
2,4-Dinitrotoluene	mg/kg	1800	CL:AIRE 2009
2,6-Dinitrotoluene	mg/kg	450	CL:AIRE 2009
Tributyl tin oxide	mg/kg	3400	CL:AIRE 2009

## Soil Contamination – Risk of Harm to Property

### Structures and Underground Services

#### Buried Concrete

BRE Special Digest 1 (2005), 3<sup>rd</sup> Edition, entitled *Concrete in aggressive ground*, provides guidance on the specification for concrete for installation in natural ground and in brownfield locations. The procedures given for the ground assessment and concrete specification cover the fairly common occurrences of sulfates, sulfides and acids, and the more rarely occurring aggressive carbon dioxide found in some ground and surface waters, which affects concrete foundations and sub-structures. It gives procedures for specification of concrete and applies to both buildings and civil engineering construction.

#### Water Supply Pipes

Guidance is provided in the UK Water Industry Research (UKWIR) report entitled “*Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites*” Report Ref. No. 10/WM/03/21, 2010.

Guidance is provided in the November 2010 Q&A Update and the Questions and Answers Sheet dated 4 May 2011 included at the back of the UKWIR report. Item 3 has been reproduced here:

Table J.2: UKWIR report guidance regarding use of barrier water pipes

Item	Question	Answer
3	Following the flow chart in Figure 1.1, <b>would it be acceptable to not undertake a site investigation and specify the use of barrier pipes</b> (these seem to be suitable for all conditions)? Would it be acceptable to adopt the blanket approach of always using barrier pipes at Brownfield sites, negating the need for a desk study or intrusive investigation?	The UKWIR project steering group decided that barrier pipes would provide sufficient protection for the supply of drinking water in all Brownfield site conditions. It is therefore reasonable to expect that water companies will accept the use of barrier pipe in all situations as a blanket approach

## Soil Contamination – Risk of Combustion

The combustibility of soils is a complex function of soil type, energy content, and availability of oxygen. The Building Research Establishment (BRE) has published guidance based on Calorific Value (i.e. energy content, alone), namely *IP 2/87, Fire and explosion hazards associated with the redevelopment of contaminated land*. This document provides a level below which combustibility is unlikely (2MJ/kg) and a level above which combustibility is likely (10MJ/kg). In the range between these two values combustibility is uncertain. Therefore, where the lower value is exceeded, the other key factors mentioned above need to be considered.

## Soil Contamination – Risk of Harm to Vegetation

Where there is topsoil present on Site and it is being considered for reuse in landscaped areas then it needs to be assessed for its suitability for use by an appropriately qualified specialist. Topsoil can be both naturally-occurring and manufactured. The requirements for topsoil that is to be reused on site are specified in BS3882:2007 and cover a range of properties including texture, organic matter content, grading, pH, nutrients and phytotoxic contaminants. The specification for phytotoxic contaminants is reproduced in the table below:



Table J.3: Phytotoxic Contaminants (by soil pH) for Topsoil

Contaminant*	pH		
	<6	6.0 to 7.0	>7
Zinc (Nitric acid extractable**)	<200mg/kg	<200mg/kg	<300mg/kg
Copper (Nitric acid extractable**)	<100mg/kg	<135mg/kg	<200mg/kg
Nickel (Nitric acid extractable**)	<60mg/kg	<75mg/kg	<110mg.kg

Footnotes: \* The lower of the Generic Assessment Criteria for chemical contaminants (human health and the environment) and phytotoxicity shall be used for topsoil

\*\* The method of testing is given in Annex D to BS3882:2007 Specification for topsoil and requirements for use.

The risk to human health and the environment needs to be considered as well as phytotoxicity and this will be carried out using the Generic Assessment Criteria selected for these risks as described elsewhere in this appendix and this report.

In order to assess the suitability of topsoil to be reused the full range of testing specified needs to be carried out and assessed by an appropriately qualified specialist.

## Controlled Waters Generic Assessment Criteria

The Screening Values adopted by Waterman for ground and surface water quality have been selected on the basis of the water quality standards that apply at the controlled water receptor considered to be at potential risk of harm.

### Surface Waters

The Water Framework Directive (WFD) (2000/60/EC) was originally introduced in 2000, however a raft of Daughter Directives have been brought in to address the objectives the WFD originally set out. Over time the WFD and its Daughter Directives have gradually replaced number of the existing Directives including the Dangerous Substances Directive (DSD) and Surface Water Directive (SWD).

The WFD identifies 'Priority' and 'Priority Hazardous Substances', to which Environmental Quality Standards (EQS) have been determined. The WFD EQS do not provide a full complement of applicable values to adopt. In the absence of an EQS, values under the replaced Surface Water Directive have been used as a guide.

### Groundwater

The WFD, to date, have not set threshold values for groundwater on a river basin basis. Therefore, when assessing groundwater quality where no human health receptors or other aquifers are identified, Waterman GAC are used. These GAC are derived from a combination of available standards derived from the Protection of Aquatic Life (UK) values, Protection of Surface Water Quality (UK) values, Groundwater Framework Directive Test 2 (Groundwater Impacts on Surface Waters Threshold Values) and Protection of Inland Freshwaters (EU).

**Table J.4 - Screening Values – Protection of Inland Freshwaters (UK Standard) and >100mg/l CaCO<sub>3</sub>**

Determinant	Units	Value
Copper (Dissolved)	112.0000	ug/l
Zinc (Dissolved)	500.0000	ug/l
Ammonia	0.2500	mg/l
Biological Oxygen Demand	2.5000	mg/l

**Table J.5 - Screening Values – Waterman criteria for groundwater with an ecological receptor**

Determinant	Protection of Surface Water Quality (UK)	Protection of Aquatic Life (UK)	Groundwater Framework Directive Test 2 (Groundwater Impacts on Surface Waters Threshold Values)	Protection of Inland Freshwaters (EU)
Arsenic (Dissolved)	50ug/l			
Boron (Dissolved)		2000ug/l		
Cadmium (Dissolved)	0.45ug/l			
Chromium (Total)		3.4ug/l		
Chromium (Hexavalent)		3.4ug/l		
Copper (Dissolved)	28ug/l			
Iron		1000ug/l		
Lead (Dissolved)	7.2ug/l			
Mercury (Dissolved)	0.07ug/l			
Nickel (Dissolved)	20ug/l			
Vanadium		20ug/l		
Zinc (Dissolved)	125ug/l			
Cyanide (free)	0.001ug/l			
Total Sulphur as Sulphate		400mg/l		
Chloride as Cl w		250mg/l		
Ammonia	0.2mg/l			
Benzene	50ug/l			
Toluene	50ug/l			
Ethyl Benzene		200ug/l		
Xylenes	0.03ug/l			
Phenol	7.7ug/l			
Phosphate as P			536ug/l	
Biological Oxygen Demand				2.5mg/l
Phenol	7.7ug/l			

Determinant	Protection of Surface Water Quality (UK)	Protection of Aquatic Life (UK)	Groundwater Framework Directive Test 2 (Groundwater Impacts on Surface Waters Threshold Values)	Protection of Inland Freshwaters (EU)
2-Chlorophenol	0.05mg/l			
1,3-Dichlorobenzene		0.2mg/l		
1,4-Dichlorobenzene		0.2mg/l		
1,2-Dichlorobenzene		0.2mg/l		
2-Methylphenol		0.3mg/l		
2,4-Dichlorophenol	0.02mg/l			
Naphthalene	0.024mg/l			
4-Chlorophenol		0.25mg/l		
Hexachlorobutadiene	0.0006mg/l			
4-Chloro-3-methylphenol	0.04mg/l			
Biphenyl	0.025mg/l			
Diethylphthalate		1mg/l		
Hexachlorobenzene	0.00005mg/l			
Pentachlorophenol	0.001mg/l			
Anthracene	0.0004mg/l			
Fluoranthene	0.001mg/l			
bis(2-Ethylhexyl)phthalate	0.0013mg/l			
Benzo[b]fluoranthene	0.00003mg/l			
Benzo[k]fluoranthene	0.00003mg/l			
Benzo[a]pyrene	0.00005mg/l			
Indeno[1,2,3-cd]pyrene	0.000002mg/l			
Benzo[g,h,i]perylene	0.000002mg/l			
m/p-Xylene	0.03mg/l			
o-Xylene	0.03mg/l			
Naphthalene	2.4ug/l			
Anthracene	0.4ug/l			
Fluoranthene	1.0ug/l			
Benzo(b)fluoranthene	0.03ug/l			
Benzo(k)fluoranthene	0.03ug/l			
Benzo(a)pyrene	0.05ug/l			
Indeno(1,2,3-cd)pyrene	0.002ug/l			
Chloroform	2.5ug/l			
1,1,1-Trichloroethane	100.0ug/l			

Determinant	Protection of Surface Water Quality (UK)	Protection of Aquatic Life (UK)	Groundwater Framework Directive Test 2 (Groundwater Impacts on Surface Waters Threshold Values)	Protection of Inland Freshwaters (EU)
Carbon Tetrachloride	12.0ug/l			
Benzene	50.0ug/l			
1,2-Dichloroethane	10.0ug/l			
Trichloroethene	10.0ug/l			
Toluene	50.0ug/l			
1,1,2-Trichloroethane	400.0ug/l			
Tetrachloroethene	10.0ug/l			
Ethylbenzene		200.0ug/l		
m and p-Xylene	30.0ug/l			
o-Xylene	30.0ug/l			
Styrene	500.0ug/l			
Hexachlorobutadiene	0.6ug/l			
Naphthalene	2.4ug/l			

## Ground Gas and Volatile Organic Compounds Generic Assessment Criteria

### Ground Gas

#### Introduction

Under Part IIA of the Environmental Protection Act 1990, Building Regulations Approved Document C 2004, and the NPPF there is a requirement to ensure ground gases from anthropogenic and natural sources are considered on a risk assessment basis. The most common gases assessed with respect to development are methane and carbon dioxide. Methane forms a potentially explosive mixture when mixed with air within certain concentration limits, known as the 'explosive range'. The Lower Explosive Limit (LEL) for methane is 5%. Carbon dioxide is a dense gas, capable of accumulating in confined spaces creating a potential asphyxiation hazard. The Occupational Exposure Limit (OEL) for a short term exposure to carbon dioxide is 1.5% over a 15-minute period. Both gases when present at high concentrations can act as simple asphyxiates by reducing the oxygen content by dilution.

Potential methane and carbon dioxide sources include;

- Land filled wastes;
- Degradable material present within the soil matrix of Made Ground;
- Peat and organic matter within alluvial deposits;
- Migrating landfill leachate;
- Foundry sands;
- Sewage sludge, dung pits/heaps;
- Burial grounds;

- Spilled or leaked petroleum hydrocarbons;
- Silt present in water bodies;
- Natural deposits, including chalk and coal measures; and
- Leaks of main gas and sewer gas.

Other gases that may be present on sites at significant levels include hydrogen sulphide, carbon monoxide, and hydrogen cyanide. These gases should be monitored in addition to oxygen, methane, and carbon dioxide, where potential for these gases to be present at unacceptable levels exist.

### Guidance

Current UK guidance has been produced by CIRIA and the British Standards Institution (BSI). The following documents have been prepared to date;

- CIRIA C665 – Assessing the risks posed by hazardous ground gases to buildings, 2007;
  - Aims to consolidate good practice in investigation, facilitate the collection of relevant data, instigate appropriate monitoring programmes, all in a risk based approach to gas contaminated land.
- BS8576 – Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs), 2013;
  - Provides guidance on the monitoring and sampling of ground gases, including methane, carbon dioxide, oxygen, and VOCs. Guidance is not provided on the risk evaluation and site characterisation, the selection and design of protective measures, verification of protective measures, sampling of atmospheric gases, and the monitoring and sampling of radon.
- CIRIA C735 – Good practice on the testing and verification of protection systems for buildings against hazardous ground gases, 2014; and
  - Sets out the good practice guidance for the designer, installer, verifier, and regulator on the verification and integrity testing of gas protection systems.
- BS8485 – Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, 2015.
  - Provides guidance on the appropriate ground gas parameters that can be used to identify a range of possible design solutions for protection against methane and carbon dioxide on a development.

Both the CIRIA and BSI publications have been prepared to be generally consistent with CLR11, *Model Procedures for the management of land contamination*, (DEFRA and the Environment Agency, 2004a) and follow a step by step approach summarised below:-

1. Desk Study and Site Walkover
2. Development of a Preliminary Conceptual Model and Risk Assessment
3. Site Investigation (If deemed necessary from stage 2)
4. Risk Assessment and Site Characterisation
5. Recommendation and Mitigation

Where, the preliminary conceptual model has deemed further investigation necessary to characterise the ground gas regime, an appropriate site investigation and monitoring regime is designed and undertaken.

In-depth guidance to assist in the investigation design is provided within C665 and BS8576, which describes intrusive investigation techniques and provides guidance on selecting the number and location of monitoring wells based on the site specific conceptual model.

Waterman has generally followed the approach recommended in CIRIA C665, BS8576, and BS8485 with respect to characterising a site and determining the levels of gas protection methods required. Where deviations from the methodology detailed within above guidance occurs, the reasoning behind the deviation and implication of the analysis of the results has been included within the report.

### **Risk Assessment**

In accordance with C665, to assess the ground gas regime at a site, the ground gas monitoring data should be assessed by determining the Gas Screening Value (GSV) (l/hr). BS8485 details further guidance on which GSV can be adopted based on a number of modifiers.

$$\text{GSV} = (\text{Measured Maximum CO}_2 \text{ or CH}_4 \text{ Gas Concentration (\%)} / 100) \times \text{Maximum Measured Gas Flow Rate from boreholes (l/hr)}$$

Both C665 and BS8485 dictate where the gas flow has been measured as less than the detection limit of the instrument used (typically <0.1l/hr), the limit of detection of the instrumented should be used as the gas flow rate.

As per the guidance given in BS8485 where a negative flow has been recorded, and there is an absence of a positive flow, a qualitative assessment has been undertaken into whether under different temporal conditions, a similar positive flow could occur. When the cause for negative flow is reasonably understood, it has been possible to rule out a corresponding credible positive flow, and discount the negative flow.

The GSV is used to classify the site, subject to the proposed end use of the site, falling into either Situation A or Situation B;

- Situation A – All development types except low rise housing with a ventilated underfloor void (150mm)
- Situation B - Low rise housing with a ventilated underfloor void (minimum 150mm)

### **Situation A – For All Development Types except Low Rise Housing with a ventilated underfloor void (150mm)**

For Situation A, the Modified Wilson and Card classification system is used. This system attributes a Characteristic Situation (CS) value to the site/zone depending upon the calculated GSV. When attributing a CS, additional factors including the maximum recorded gas concentration and the maximum recorded gas flow rate should also be taken into account and may result in an increase in the CS value. The table below, outlines the CS values, associated GSV's, and additional factors which must be taken into account.

Characteristic Situation (CIRIA 149)	Risk Classification	Gas screening value (CH <sub>4</sub> CO <sub>2</sub> ) l/hr	Additional Factors	Typical source of generation
1	Very low risk	<0.07	Typically methane ≤1% and / or carbon dioxide ≤5%. Otherwise consider increase to CS 2.	Natural soils with low organic content  'Typical' Made Ground
2	Low risk	<0.7	Borehole air flow rate not to exceed 70 l/hr. Otherwise consider increase to CS 3.	Natural soil, high peat/organic content.  'Typical' Made Ground
3	Moderate risk	<3.5		Old landfill, inert waste, mineworking flooded
4	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protective measures.	Mineworking – susceptible to flooding, completed landfill (WMP 26B criteria)
5	High risk	<70		Mineworking unflooded inactive with shallow workings near surface
6	Very High risk	>70		Recent landfill site

Notes:

- 1) Gas screening value: litres of gas / hour is calculated by multiplying the gas concentration (%) by the measured borehole flow rate (l/hr)
- 2) Source of gas and generation potential/performance must be identified.
- 3) If there is no detectable flow use the limit of detection of the instrument.

Following determination of the site's CS, the requirements and scope of gas protection measures can be proscribed based on the guidance given in BS8485:2015.

**Situation A - Ground gas protection measures: BS8485-2015**

BS8485 details the required ground gas protection measures for a Situation A development using a points based system, whereby a certain number of points must be accumulated through the installation of various protection measures to mitigate the risk to structures or buildings from the accumulation of methane or carbon dioxide. The number of points assigned will be dependent on the building type, and the CS.

Building types are separated into four distinct scenarios.

Modifier	Building Type			
	Type A	Type B	Type C	Type D
Ownership	Private	Private or commercial/public, possible multiple	Commercial/public	Commercial/industrial
Control (change of use, structural alterations, ventilation)	None	Some but not all	Full	Full
Room sizes	Small	Small/medium	Small to large	Large industrial/retail park style

Further details on the description of the building types, along with examples are included in BS8485.

Following identification of the appropriate Building Type and CS, the minimum gas protection score can be determined through the use of the following table.

Characteristic Situation	Minimum Gas Protection Score			
	Type A	Type B	Type C	Type D
1	0	0	0	0
2	3.5	3.5	2.5	1.5
3	4.5	4	3	2.5
4	6.5 <sup>A</sup>	5.5 <sup>A</sup>	4.5	3.5
5	N/A <sup>B</sup>	6.5 <sup>A</sup>	5.5	4.5
6	N/A <sup>B</sup>	N/A <sup>B</sup>	7.5	6.5

<sup>A</sup>Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system e.g. in Institutional and/or fully serviced contractual situations.

<sup>B</sup>The gas hazard is too high for this empirical method to be used to define the gas protection measures.

Post determination of the minimum gas protection score, a combination of two or more of the following three types of protection measures should be used to achieve the score;

- The structural barrier of the floor slab, or of the basement slab and walls if a basement is present;
- Ventilation measures; and
- Gas resistant measures.

Through combining at least two ground gas protection measures, the lack of redundancy in the use of a single protection measure approach is negated. The ground gas protection measures should work independently and collaboratively.

The tables below detail the specific ground gas protection measures and their associated scores.



## Structural Barrier

Floor and substructure design	Score <sup>A</sup>
Precast suspended segmental subfloor (i.e. beam and block)	0
Cast in-situ ground bearing floor slab (with only nominal mesh reinforcement)	0.5
Cast in-situ monolithic ground bearing raft or reinforced cast in-situ suspended floor slab with minimal penetrations	1 or 1.5 <sup>B</sup>
Basement floor and slab conforming to BS8102:2009, Grade 2 waterproofing <sup>C</sup>	2
Basement floor and walls conforming to BS1802:2009, Grade 3 waterproofing <sup>C</sup>	2.5

<sup>A</sup>The scores are conditional on breaches of floor slabs, etc., being effectively sealed.

<sup>B</sup>To achieve a score of 1.5 the raft or suspended slab should be well reinforced to control cracking and have minimal penetrations cast.

<sup>C</sup>The score is conditional on the waterproofing not being based on the use of a geosynthetic clay liner waterproofing product.

## Ventilation Measures

Protection element/system	Score	Comments
Pressure relief pathway (usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building.	0.5	Whenever possible a pressure relief pathway (as a minimum) should be installed in all gas protection measure systems.  If the layer has a low permeability and/or is not terminated in a venting trench or similar, then the score is zero.
Passive sub floor dispersal layer: Very good performance: Good performance: Media used to provide the dispersal layer are;	2.5 1.5	The ventilation effectiveness of different media depends on a number of different factors including the transmissivity of the medium, the width of the building, the side ventilation spacing, and type and thickness of the layer. The selected score should be assigned taking into account the recommendations in Annex B of BS8485 2015. Passive ventilation should be designed to meet at least good performance, see in Annex B of BS8485 2015. .
Active dispersal layer, usually comprising fans with active abstraction (suction) from a subfloor dilution layer, with roof level vents. The dilution layer may compromise a clear void or be formed of geocomposite or polystyrene void formers.	1.5 to 2.5	This system relies on continues serviceability of the pumps, therefore alarm and response systems should be in place.  There should be robust management systems in place to ensure the

		continued maintenance of the system including pumps and vents. Active ventilation should always be designed to meet at least good performance as described in in Annex B of BS8485 2015.
Active positive pressurization by the creation of a blanket of external fresh air beneath the floor slabs by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket.	1.5 to 2.5	This system relies on continues serviceability of the pumps, therefore alarm and response systems should be in place.  The score assigned should be based on the efficient coverage of the building footprint and the redundancy of the system. Active ventilation should always be designed to meet at least good performance.
Ventilated car park (floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park).	4	Assumes that the car fumes is vented to deal with exhaust fumes designed to <i>Buildings Regulations 2000, Approved Document F.</i>

It should be noted that for Type A buildings Active ventilation systems are inappropriate.

### Membrane

Protection element/system	Score	Comments
Gas resistant membrane meeting all of the following criteria; <ul style="list-style-type: none"> <li>• Sufficiently impervious to the gases with a methane gas transmission rate &lt;40ml/day/m<sup>2</sup>/atm (average) for sheet and joints (tested in accordance with BSO ISO 15105-1 manometric method);</li> <li>• Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;</li> <li>• Sufficiently strong to withstand in-service stresses (e.g. settlement if placed below the floor slab)</li> <li>• Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc);</li> <li>• Capable, after installation, of providing a complete barrier to the entry of the relevant gas; and</li> <li>• Verified in accordance with CIRIA C735.</li> </ul>	2	The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints.  For example a minimum 1.4mm thickness (equivalent to 370g /m <sup>2</sup> for polyethylene), reinforced membrane (virgin polymer) meets the performance criteria.  If a membrane is installed that does not meet the all the criteria in column 1 then the score is zero.

A gas protection score should only be assigned to a membrane which is formed of a material with suitably low gas permeability and which has been installed so it completely seals the foundation (including effective seals around all penetrations) and does not sustain damage from in-service stresses.

### Situation B – For Low Rise Housing with a ventilated underfloor void (min 150mm)

Situation B should be used for low-rise residential housing constructed using a beam and block floor construction and a clear sub-floor void. Where a sub-space void is not proposed, the development falls under the Situation A classification system.

For situation B, the National House Building Council's (NHBC) Traffic Light classification system is used. This system attributes a colour to a site/zone depending upon the calculated GSV. As with the Wilson and Card system, in addition to the GSV, additional factors including the maximum recorded gas concentration and the maximum recorded gas flow rate must be taken into account when determining the Traffic Light classification. The table below outlines the Traffic Light classification system, based on the calculated GSV's and additional factors which must be taken into account.

#### NHBC traffic light system for 150mm void

Traffic Light	Methane		Carbon Dioxide	
	Typical Maximum Concentration (% v/v)	Gas Screening Value (GSV) l/hr	Typical Maximum Concentration (% v/v)	Gas Screening Value (GSV) l/hr
Green	1	0.16	5	0.78
Amber 1	5	0.63	10	1.56
Amber 2	20	1.56	30	3.13
Red				

#### Notes:

- The worst gas regime identified at the site, either methane or carbon dioxide, recorded from monitoring in the worst temporal conditions, will be the decider as to what Traffic Light and GSV is allocated.
- Generic GSVs are based on guidance contained within latest revision of Department of the Environment and the Welsh Office (2004 edition) "The Building Regulations: Approved Document C" [Ref:17] and used a sub-floor void of 150mm thickness.
- This assessment is based on a small room e.g. downstairs toilet with dimensions of 1.5 x 2.5m, with a soil pipe passing into the sub-floor void.
- The GSV, in litres per hour, is as defined as the bore hole flow rate multiplied by the concentration of the particular gas being considered.
- The typical maximum concentrations can be exceeded in certain circumstances should the conceptual site model indicate it is safe to do so. This is where professional judgement will be

required based on a thorough understanding of the gas regime identified at the site where monitoring in the worst case temporal conditions has occurred.

- The GSV threshold should not generally be exceeded without completion of a detailed gas risk assessment taking into account site specific conditions.

Once the Traffic Light classification has been determined, the requirements and scope of gas protection / mitigation measures can be determined based on the following table (CIRIA C665):

#### Gas Protection Measures for Low-Rise Housing Development Based Upon Allocation NHBC Traffic Light (Boyle and Witherington, 2006)

Traffic Light Classification	Protection Measures Required
<b>Green</b>	Negligible gas regime identified and gas protection measures are not considered necessary.
<b>Amber 1.</b>	Low to intermediate gas regime identified, which requires low-level gas protection measures, comprising a membrane and ventilated sub-floor void to create a permeability contrast to limit the ingress into buildings. Gas protection measures should be as prescribed in BRE Report 414 (Johnson 2001). Ventilation of sub-floor void should facilitate a minimum of one complete volume change per 24 hours.
<b>Amber 2.</b>	Intermediate to high gas regime identified, which requires high level gas protection measures, comprising a membrane and ventilated sub-floor void to create a permeability contrast to prevent the ingress of gas into buildings. Gas protection measures should be as prescribed in BRE Report 414. Membranes should always be fitted by a specialist contractor. As with Amber 1, ventilation of the sub-floor void should facilitate a minimum of one complete volume change per 24 hours. Certification that these passive protection measures have been installed correctly should be provided.
<b>Red</b>	High gas regime identified. It is considered that standard residential housing would not normally be acceptable without a further Gas Risk Assessment and / or possible remedial mitigation measures to reduce and / or remove the source of gas.

#### Volatile Organic Compounds

Similar to ground gas, under the Environmental Protection Act 1990, Building Regulations Approved Document C 2004, and the NPPF there is a requirement to ensure that Volatile Organic Compounds (VOC) are considered on a risk assessment basis.

VOCs are organic compounds that are volatile under normal atmospheric conditions. However, they may be found in the solid, liquid, and the dissolved phase as well as in the gaseous phase. VOCs are typically found in the following contaminants;

- Petroleum (non-halogenated) hydrocarbons (e.g. benzene, toluene, and butylbenzenes);

- Halogenated hydrocarbons (e.g. chlorinated ethenes and ethanes (dry cleaning fluids or degreasers) or chlorofluorocarbons (freons)); and
- Organic compounds containing nitrogen, sulphur, and oxygen (e.g. tetrahydrofuran).

The likely sources of the above contaminants include;

- Spills, leaks, and discharges from industries;
- Landfills;
- Buildings, furnishings, and common household products;
- Vehicle emissions;
- Marshland; and
- Uncontrolled waste disposal.

The risk to receptors from VOC occur from inhalation (acute and chronic), and a flammable/explosive risk when present at high concentrations in confined spaces.

Current UK guidance for VOCs are limited in comparison to ground gas, and is primarily given in the *“The VOCs Handbook; Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination”*, CIRIA Report C682, 2009.

The risk to receptors from VOCs has been assessed on a semi-quantitative basis as set out by CIRIA C682. Whereby the vapour concentration recorded during headspace analysis of soils, SVOC/VOC contaminant concentration within soil and groundwater samples, and the vapour concentration within installed boreholes are qualitatively assessed to determine whether a significant risk of a potential pathway exists.

Where a significant risk of a potential pathway exists further assessment will be required, this may include, vapour sampling, further intrusive investigations, or a Detailed Quantitative Risk Assessment (DQRA). Dependent on the results of the further assessment, remedial measures will be required to mitigate the risk to receptors.

## **Appendix K**

### **Data from Previous Investigations**

- **AECOM – Stag Brewery, Mortlake: Phase 2 Environmental Site Assessment Report. September 2015 (Report ref. 47075502)**

***STAG BREWERY  
MORTLAKE***




***Phase 2 Environmental  
Site Assessment Report***

***September 2015***

***47075502***

***Prepared for: AB InBev UK Limited***

***Prepared by: AECOM***

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	Name	Signature	Date	Position
Prepared by	Massimo Masala		22 September 2015	Senior Consultant
Checked by	Gary Marshall		22 September 2015	Associate
Approved by	Gary Marshall		22 September 2015	Associate

**Issued by:**

AECOM Infrastructure & Environment UK Limited  
St George's House  
5 St George's Road  
Wimbledon  
London  
SW19 4DR



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## EXECUTIVE SUMMARY

AECOM Infrastructure & Environment UK Limited (AECOM) was appointed by AB In-bev UK Limited to undertake soil and groundwater quality monitoring at the Stag Brewery, Mortlake, London, SW14 7ET.

**Site Characterisation Scope:** The site investigation undertaken included the drilling of two boreholes with groundwater monitoring well installations to supplement the existing network of thirteen groundwater monitoring wells installed during previous phases of investigation. Twenty-eight soil bores were also drilled across the Site to provide a higher density of exploratory points, better understand the ground conditions and collect soil samples for laboratory chemical analysis.

**Ground Conditions:** The ground conditions at the site were assessed from twenty-eight soil bores were drilled using dynamic percussive drilling techniques to a maximum depth of 5.0m below ground level (bgl). The drilling work was undertaken between 20 and 28 August 2015. The deepening sequence of geology encountered in the site investigation includes Made Ground, superficial deposits of River Terrace Gravels and London Clay bedrock.

Made Ground is between 1.2m and 2.6m thick and comprised loose roadstone, red/yellow brick and concrete gravels, sand and gravels of flint and occasional reworked clay. Buried obstructions, thought to represent relict concrete slabs, were encountered at eleven locations.

The boundary between the River Terrace Deposits and London Clay was encountered at depths between 6.5 and 6.9m bgl. The London Clay was encountered to the maximum depth of drilling (7.0 bgl).

**Groundwater:** Groundwater elevation monitoring on 28 August 2015 indicated the groundwater to be between 3.57 and 5.14 mbgl. Groundwater flow direction is inferred to be west. The tidal effects of the River Thames were measured in three boreholes across the site by continuous monitoring over 2.5 days. The results indicated a maximum fluctuation of 60mm in a well 20m from the River Thames. However, no measurable effect on groundwater elevation was recorded on the two wells located 65m and 200m from the River Thames.

**Soil Quality:** No obvious visual or olfactory evidence of hydrocarbon contaminated soils was noted from the drilling arisings. Furthermore, only one result (2.1ppm) out of 113 screening tests performed was above the detection limit (<0.1ppm) of the Photo-Ionisation Detector (PID) equipment during soil headspace monitoring.

A total of 25 samples of Made Ground and 14 samples of natural ground were analysed at Alcontrol Laboratories for a suite of inorganic and organic chemical parameters. The results were compared to generic assessment criteria (GAC) suitable for three possible end uses: residential with gardens, residential without gardens and commercial. The comparison indicated that the soil chemistry does not represent an unacceptable risk to human health regardless of the end use scenario.

**Asbestos Containing Materials (ACMs):** During the site investigation suspected ACMs were observed as fragmented tiles from one exploratory hole (BH4A between ground level and 1.3m bgl). A total of twenty-six samples of Made Ground were also visually screened at the analytical laboratory (by microscope) and asbestos fibres were observed in eight samples. Asbestos quantification analysis on the eight samples measured a concentration of ACMs <0.1% and below the hazardous waste criteria threshold.

Asbestos in soils is not considered an unacceptable risk for future residential and or commercial site use given the relatively low volumes measured in the samples. Future below ground works should consider the potential for asbestos to be present in Made Ground and appropriate standard construction controls adopted.

**Groundwater Quality:** During groundwater monitoring no obvious visual or olfactory indication of contamination was identified from the sampled groundwater. A total of fourteen groundwater samples were analysed at Alcontrol Laboratories for a suite of inorganic and organic chemical parameters. The results were compared to GAC protective of the adjacent River Thames (marine Environmental Quality Standards)

and England Drinking Water Standards. The comparison indicated that the majority of chemical parameters were below the relevant GAC and, although some minor exceedances were measured at isolated locations, the groundwater quality is considered commensurate with that in an urban environment.

**Conclusions:** The site characterisation has not encountered soil and groundwater conditions that represent a constraint to redevelopment of the Site for mixed commercial and residential use above what would normally be expected from previously developed land.

The chemical analysis of the Site soils and groundwater has not identified concentrations that represent an environmental risk to human health or controlled waters. No environmental improvement works are considered necessary at the Site based on a mixed use development scheme.

It is likely that works to remove relict buried foundations and slabs will be required to allow construction of deep structures and foundations. Furthermore, it is unlikely that the physical composition of the existing shallow Made Ground soils will be of suitable composition for use in soft planted areas. Imported soils are therefore likely to be required for green open spaces and landscaping.

## 1. INTRODUCTION

### 1.1 General Introduction

This report presents the findings of a Phase 2 Environmental Site Assessment (ESA) at the Stag Brewery, Mortlake, London, SW14 7ET (the "Site"). A site location plan is presented in **Figure 1**.

The Stag Brewery has been used for the production and packaging of alcoholic beverages since the late 1850s. However, the Stag Brewery will cease manufacturing operations in 2015 and the site is to be divested for redevelopment.

### 1.2 Objectives

The objective of this report is to present an assessment of the environmental ground conditions at the Site. Specifically, the objectives are to:

1. Perform an environmental assessment of the site to evaluate the chemical status of the underlying soil and groundwater conditions. The results of this assessment will be used to refine the conceptual site model (CSM) and to evaluate the potential for plausible contaminant linkages and unacceptable environmental risk at the Site; and
2. Evaluate whether the soil and groundwater conditions represent a constraint to site redevelopment for mixed residential, retail and commercial uses and determine whether a contamination remediation and verification scheme will be required.

### 1.3 Scope of Work

A summary of the scope of work performed to meet the objectives of this study are set out below. The scope was designed following the review of existing Site information (**Section 2**) and based on the proposed site redevelopment for mixed uses. The rationale for each exploratory hole is provided in **Section 3.1**.

- The drilling of a borehole (BH201A) using rotary drilling techniques to 6.0m bgl adjacent to the Site boundary with the River Thames in the north of the Site.
- The drilling of two boreholes (BH203 & BH203A) using rotary drilling techniques in the east of the Site.
- The drilling of twenty-eight soil bores (BH2A to BH5A, BH7A to BH10A, BH201 to BH214A) using percussive drilling techniques to 5.0m bgl to provide shallow ground conditions assessment across the Site.
- Sampling and laboratory chemical analysis of soil samples from twenty-four boreholes for a suite of inorganic and organic chemical parameters.
- Installation of a groundwater monitoring well in the superficial gravels at BH201A and in the Made Ground at BH203 & BH203A.
- A return visit to monitor and sample groundwater from BH201A and the existing network of thirteen monitoring wells across the site.
- Laboratory chemical analysis of thirteen groundwater samples and one duplicate for a suite of inorganic and organic chemical parameters.

- Evaluation of the chemical soil and groundwater results by performing a generic quantitative risk assessment (GQRA) considering risks to human health and controlled waters.

The scope of work listed above was completed between 20 August and 21 September 2015.

## 2. PROJECT BACKGROUND

### 2.1 Site Location & Description

The site is located in Mortlake, London, SW14 7ET. The Site is centered at National Grid Reference 520360, 175990. A site location plan is presented in **Figure 1**.

The site covers a total area of 84,697m<sup>2</sup>, which is divided between an East Site and West Site, separated by Ship Lane:

- East Site covers an area of 54,057m<sup>2</sup> and includes seven buildings, a trailer park with a weighbridge, a warehouse, an energy centre and storage blocks.
- West Site covers an area of 30,640m<sup>2</sup>. The West Site comprises production buildings, workshop and stores, bulk gas storage, fabrication shop, ancillary plant, the former effluent plant, car park and Watney's sports ground.

The general site layout is shown on **Figure 2**.

### 2.2 Surrounding Land Use

Surrounding land uses are indicated on **Figure 2** and include the following:

- North: The River Thames is adjacent to the northern boundary of the East Site. Residential properties and a public house are located immediately north of the West Site between the site boundary and the River Thames.
- South: The A3003 (Lower Richmond Road) is adjacent to the southern Site boundary. Beyond this are residential and commercial properties, Mortlake Green and Mortlake Station. The Richmond Line of the London and South Western Railway runs east-west and is located approximately 100m south of the site at its closest point;
- East: The land use to the east mostly comprises residential properties with some commercial properties; and
- West: Residential properties are located adjacent to the western site boundary, with Clifford Avenue running south-west-north-east 115m from the site. Beyond this is Mortlake Crematorium and cemetery.

### 2.3 Site Topography

The site topography has been evaluated based on the topographic survey completed across the proposed development site in 2015<sup>1</sup>.

The topographical survey has indicated the general current site elevations to be generally between 5.72m and 6.55m above Ordnance Datum (mAOD).

### 2.4 Previous Site Evaluation

AECOM completed a Phase 1 ESA (ESA) in July 2015. In preparation of the Phase 1 ESA, AECOM were provided with seven historical environmental assessment reports (see **Section**

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<sup>1</sup> Data provided by AB Inbev following survey of a specialist contractor (August 2015). Topographical Survey at Stag Brewery Mortlake.



**8; References)** completed between 1995 and 2012. Pertinent information extracted from the Phase 1 ESA and the historical reports is detailed below.

- The brewery has been present in East Site since at least 1868, with the remainder of the East Site occupied by residential properties. The brewery expanded or was redeveloped by 1896, replacing the residential houses. The brewery buildings are first shown in West Site in the mid- 1960s, at which time the whole of the East Site is developed with brewery buildings. Both sites are in their current 2015 layout by 2006.
- The Stag Brewery Site is underlain by Made Ground followed by Superficial Deposits (River Terrace Gravels) and by London Clay.
- Groundwater rests within the Superficial Deposits at depths between approximately 2.0m to 5.5m bgl. Groundwater is not abstracted for use within 230m of the Site and is not within a groundwater source protection zone.
- The River Thames, the Superficial Deposits and the residents located immediately south and west of the Site represent sensitive receptors.
- A network of thirteen boreholes with groundwater monitoring wells was installed across the Brewery between 1995 and 2003. Groundwater from these wells has been monitored and samples collected for laboratory analytical testing on four occasions between 2003 and 2012. Results of this monitoring have not identified unacceptable or widespread groundwater contamination at the Stag Brewery.
- Soil sampling from seven soil bores drilled in 2003 did not indicate elevated concentrations of metal and total petroleum hydrocarbon concentrations in soils.

Overall, the lack of widespread measurable chemical contamination in soil and groundwater beneath the Site suggested that there is not an unacceptable risk of adverse impact to human health, groundwater or the River Thames. However, localized areas of potential impact to chemical soil and groundwater quality could not be discounted. This Phase 2 ESA was therefore commissioned to further investigate the ground conditions beneath the Site with a higher density of exploratory boreholes and additional soil and groundwater chemical testing to update the site conceptual site model (CSM).

### 3. METHODOLOGY & APPROACH

#### 3.1 Site Investigation Rationale

The evaluation of the existing environmental assessment data and CSM presented in the Phase 1 ESA has indicated that a higher density of exploratory holes is required on the Site to evaluate the current soil and groundwater conditions. In particular, the previous site assessment data was principally from the West Site, with limited information for the East Site. The rationale was therefore to determine:

- The nature and thickness of the Made Ground and the shallow geology across the East and West Site area; and
- Inspect and sample shallow soil and groundwater from across the site for laboratory chemical analysis.

An exploratory hole location plan is included as **Figure 3**. The rationale for the positioning of each exploratory hole is given in **Table 3.1**.

Table 3.1: Site Investigation Rationale	
Investigation Location ID	Location and Rationale
BH2 (existing well) BH2A (proposed soil bore)	BH2A to be drilled adjacent to above ground heavy fuel oil storage tanks on the western edge of the East Site. Groundwater monitoring well BH2 is located approximately 1.0m from BH2A.
BH3 (existing well) BH3A (proposed soil bore)	BH3A to be drilled down topographic gradient of a diesel storage tank in the north of the West Site. Groundwater monitoring well BH3 is located approximately 1.0m from BH3A.
BH4 (existing well) BH4A (proposed soil bore)	BH4A and BH5A to be drilled in the contractors' storage area in the north of West Site. Groundwater monitoring wells BH4 and BH5 are located within approximately 1.0m from BH4A and BH5A respectively.
BH5 (existing well) BH5A (proposed soil bore)	
BH7 (existing well) BH7A (proposed soil bore)	BH7A to be drilled south of workshop building in west of the West Site in the area of tanker clean in place (CIP). Groundwater monitoring well BH7 is located approximately 1.0m from BH7A.
BH8 (existing well) BH8A (proposed soil bore)	BH8A to be drilled within the empty waste container and waste storage area in the west of the West Site. Groundwater monitoring well BH8A is located approximately 1.0m from BH8A.
BH9 (existing well) BH9A (proposed soil bore)	BH9A to be drilled adjacent to area of suspected trade drain leakage between the Brew House and Fermentation Block (eastern half of the West Site). Groundwater monitoring well BH9 is located approximately 1.0m from BH8A.
BH109 (existing well) BH109A (proposed soil bore)	BH9A to be drilled in a storage area for acids and alkalis to the north of the beer conditioning building (north-east of the West Site). Groundwater monitoring well BH109 is located approximately 1.0m from BH109A.

**Table 3.1: Site Investigation Rationale**

Investigation Location ID	Location and Rationale
BH201 & BH201A	<p>BH201 &amp; BH201A are adjacent to a former heavy fuel storage vault in the B Block building and also down-gradient of the Packaging Building (north-west corner of the East Site). This location is at the Site northern boundary and 20m from the River Thames.</p> <p>BH201 and BH201A represent two attempts to penetrate or avoid the obstruction. BH201A was able to reach the intended depth (6m bgl) and a well installed to monitor the groundwater quality.</p>
BH202 & BH202A	<p>To be drilled in the north of the East Site to provide general Site coverage.</p> <p>The presence of an obstruction at 1.8m bgl meant that the intended drilling depth and installation of a groundwater monitoring well in the superficial gravels could not be completed. BH202 and BH202A represent two attempts to penetrate or avoid the obstruction.</p>
BH203 & BH203A	<p>BH203 &amp; BH203A were drilled in the east of East Site where vehicle maintenance and oil storage areas were historically located and to provide general Site coverage.</p> <p>The presence of an obstruction at 3.0m meant that the intended drilling depth and installation of a groundwater monitoring well in the superficial gravels could not be completed. BH203 and BH203A represent two attempts to penetrate or avoid the obstruction. Groundwater monitoring well were installed in both boreholes within the Made Ground.</p>
BH204	<p>To be drilled in the south of the East Site to provide general Site coverage south of the Packaging Building.</p>
BH205	<p>To be drilled in the east of the East Site to provide general Site coverage east of the Packaging Building.</p>
BH206	<p>To be drilled in the south-east of the East Site to provide general Site coverage south-east of the Packaging Building.</p>
BH207	<p>To be drilled on the south-western corner of the Packaging Building between the Power House chemical store (Area 13) and Packaging Waste Oil storage area (Area 14).</p>
BH208 / BH208A	<p>To be drilled to investigate the soil conditions within the Trailer Park immediately north of the Energy Block.</p> <p>BH208 and BH208A represent two attempts to penetrate or avoid an obstruction.</p>
BH209	<p>To be drilled in the south of the East Site to provide general Site coverage.</p>
BH210	<p>Targeted to investigate the soil conditions south of the operational area.</p>
BH211	<p>Targeted to investigate the soil conditions in the vicinity of the KG Slurry Tank and the remaining operational area.</p>
BH212	<p>To be drilled to investigate an oil storage area adjacent to the engineering workshop (north-west of West Site). Groundwater monitoring well BH112 is located approximately 2m from BH212.</p>
BH213	<p>To be drilled within contractors' storage area in the north of West Site.</p>

**Table 3.1: Site Investigation Rationale**

Investigation Location ID	Location and Rationale
BH214 / BH214A	To be drilled in the north of the East Site to provide general Site coverage. The presence of an obstruction at 2.6m meant that the intended drilling depth and installation of a groundwater monitoring well in the superficial gravels could not be completed. BH214 and BH204A represent two attempts to penetrate or avoid the obstruction.

The exploratory investigation work was undertaken between 20 and 28 August 2015. The following methodology and approach was undertaken to meet the objectives of this study.

### 3.2 Health and Safety Planning

The site works were conducted in accordance with AECOM pre-determined health, safety and environment arrangements, standard operating procedures and method statements. A detailed site inspection was undertaken on 20 August 2015 by AECOM to select sampling locations and determine the most appropriate sequence of work.

A detailed survey of the buried services in the vicinity of the proposed exploratory locations was undertaken by a specialist contractor employed by Site Vision Surveys Limited the 20<sup>th</sup> of August 2015. This was undertaken with reference to Site supplied buried services and utility plans.

The 28 exploratory positions were also pre-excavated by hand to a minimum depth of 1.2m bgl as a secondary precaution and as a pre-drill check. No buried services were exposed in the hand excavated pits.

### 3.3 Hand Excavated Pits

The pre-drill pits were excavated at the 28 drilling locations using concrete coring or hand-held breaker to penetrate site hardstanding and then hand tools to a depth of 1.2m. These pits allowed environmental soil inspection, sampling and logging in the upper 1.2m of soil and also as a precautionary pre-drill check of the shallow subsurface for potential buried services.

The depths of twenty-three excavated positions were extended by drilling (see **Sections 3.5 & 3.6**). Hand pits BH201, BH202, BH208, BH7B failed to penetrate a shallow concrete slab obstructions at 0.8m bgl and was therefore unable to progress as a soil bore.

### 3.4 Soil Bores

Twenty-three soil bores (BH2A, BH3A, BH4A, BH5A, BH7A, BH8A, BH9A, BH109A, BH202A, BH203, BH203A, BH204, BH205, BH206, BH207, BH208A, BH209, BH210, BH211, BH212, BH213, BH214 and BH214A) were drilled using dynamic percussive drilling techniques to a maximum depth of 5.0m bgl. The boreholes were drilled at 100mm diameter and soil arisings were recovered in plastic lined cores for detailed inspection, logging and sampling.

On completion of the inspection and soil sampling the exploratory positions that had penetrated the full thickness of Made Ground were infilled with bentonite clay pellets and hydrated to seal the boreholes. Where the boreholes failed to penetrate the Made Ground, the

boreholes were infilled with the excavated spoil in the general order of excavation. The site surfacing was reinstated to a similar condition to previous. The borehole logs are included in **Appendix B**.

### **3.5 Borehole Drilling & Well Construction**

Borehole BH201A was drilled to a depth of 6.0m bgl using rotary techniques and a 350mm diameter auger. The monitoring well was constructed with 50mm diameter High Density Polyethylene (HDPE) monitoring standpipes. The well installation in BH201A has a screened section between 2.0m and 5.5m bgl designed to intersect the groundwater table in the Superficial gravels (at approximately 3.7m bgl) to allow for possible groundwater fluctuation across the well screen due to the tidal influence from the adjacent River Thames. The response zone annulus was filled with washed 4mm gravel and the annulus above the response zone sealed with bentonite pellets hydrated with site tap water. The well was completed with lockable headwork concreted into place flush with the surrounding ground surface. The borehole logs, including monitoring well construction details, is included in **Appendix B**.

BH203 was initially targeted to investigate soil and groundwater, however due to the presence of underground obstructions it was abandoned and location BH203A was selected. Another obstruction in BH203A was found. A groundwater monitoring well was installed in both boreholes within the Made Ground.

It was considered that Made Ground collapsed when the drilling augers were pulled from the excavations just before the insertion of the well pipe. Following the wells development, it was decided to exclude these wells from the monitoring stage as the excessive amount of sand and silt accumulated in both standpipes within a short period may influence the quality and representativeness of the groundwater samples.

### **3.6 Soil Logging & Sampling**

The soil cores and excavated materials were logged by an experienced field geologist as drilling progressed. The logging was undertaken in general accordance with BS EN ISO14688, BS EN ISO14689 and BS5930:1999.

During logging the field geologist inspected the excavated for possible visual and olfactory indications of hydrocarbon contamination or discoloured/ stained soils. These observations (if any) are also presented on the exploratory borehole logs.

A portable monitoring instrument (Photo Ionisation Detector (PID)) was used to measure soil headspace for ionisable hydrocarbons. Soil samples were taken at regular intervals through the unsaturated soil profile, placed in sealed plastic bags, manipulated by hand and left for a short time (typically 5 minutes). The headspace above the soil in the bags was then tested for the presence of ionisable hydrocarbons using the PID (fitted with a 10.6 eV lamp and calibrated to isobutylene).

Soil samples were selected for laboratory testing at the discretion of the AECOM field engineer and based on the PID readings and site observations. Soil samples were transferred directly into laboratory-supplied containers and labelled for shipment, under chain of custody procedures. Soils containers were stored in cooler boxes containing ice packs to maintain low temperatures during storage and shipment to the laboratory.

### 3.7 Groundwater Monitoring

On 20 August 2015 AECOM completed an inspection of the existing monitoring well network to confirm the locations of the thirteen existing groundwater monitoring wells (BH2, BH3, BH4, BH5, BH7, BH8, BH9, BH10, BH104B, BH109, BH110, BH111 and BH112). Each of these thirteen wells was located and the headworks and standpipes intact. The inspection included the measurement of the groundwater level in the wells and comparison with the as-built borehole logs to determine the thickness of sediment in the well bases. This indicated significant sediment accumulations, up to 2.13m, in the wells that required de-silting followed by well development to determine whether the wells represented robust groundwater sampling locations.

On 24 and 25 August 2015 AECOM undertook the de-silting of all existing groundwater monitoring wells. Air lift surging technique was used to de-silt all monitoring wells. The monitoring wells were alternatively surged and pumped with air using a petrol operated compressor in combination with a peristaltic pump. In air surging, air was injected into the wells to lift the water to the surface. As the air bubbles rose, they created a surging effect that carried water and dislodged the sediments out of the well. As the groundwater reached the top of the casing, the air supply was shut off, allowing the aerated water column to fall. A peristaltic pump was used to pump each well periodically to remove the silt and sand deposits from the screen and bottom of the boreholes.

The desilting works were successful and further details are included in **Appendix A**. Following the desilting and purging, standing water levels ranging between 4.15m and 5.25m bgl were measured in the monitoring wells, with the exception of well BH112 which remained dry due to stiff mass of silt and sand deposits on the bottom of the well that could not be removed.

With the exception of BH9 where fast drawdown and slow recharge of groundwater was noted, all monitoring wells displayed slow drawdown and fast recharge. This, along with the amount of water available, suggested that the monitoring network was adequate to collect a good quality sample set from the saturated zone of the superficial deposits.

The groundwater was left to equilibrate for a period of three days following the successful desilting and development the twelve existing wells and development of the new well (BH201A). AECOM then returned to the Site to install water level loggers in three monitoring wells (BH201A, BH4 and BH10). The loggers were left in the wells for 2.5 days (between 28 August and 31 August 2015) to measure potential tidal influences on groundwater elevation.

Level loggers were installed at the following locations:

- BH4: At the northern boundary of the West Site and approximately 65m from the River Thames;
- BH10: In the central portion of the West Site and approximately 200m from the River Thames); and
- BH201A: On the northern boundary of the East Site and approximately 20m from the River Thames.

These locations were selected to evaluate the tidal influence at variable distance from the River Thames and to provide good spatial representation across the Site. A barologger was installed in monitoring well BH2 for the entire period of tidal monitoring to enable data corrections to account for variations in barometric pressure. Graphs showing groundwater

elevation versus time for each of the tidal monitoring locations are presented in the **Graphs Section**.

### 3.8 Groundwater Sampling

Groundwater monitoring and sampling was completed by an AECOM site engineer on 1<sup>st</sup> and 2<sup>nd</sup> September 2015 and six days following the well de-silting and development. Prior to purging and sampling, the groundwater levels and volumes of groundwater within the monitoring wells were established using an air/oil/water interface probe. Monitoring wells were purged of at least three well volumes or until groundwater parameters (pH, temperature, electrical conductivity, reduction-oxidation (redox) potential and dissolved oxygen content) had stabilised across at least three consecutive readings taken at intervals during purging. Purging and sampling was carried out using a dedicated low-flow sampling peristaltic pump and flow cell in order to provide accurate parameter measurements and to minimise groundwater agitation.

### 3.9 Environmental Laboratory Analysis

The soil and groundwater samples were shipped to ALcontrol Laboratories for chemical analysis. The analytical schedule of tests is included as **Table 3.9a** and **3.9b** and with details for each sample included in **Tables 1** and **2** appended to this report. The results of the laboratory analysis included on appended **Tables 3** and **4** attached with this report.

Table 3.9: Laboratory Soil Chemical Analysis		
Analysis Suite	Made Ground	Superficial Deposits
Metals in solid samples	23	14
Hexavalent Chromium	23	14
PAH	23	14
TPH CWG	23	14
VOC MS	23	14
EPH CWG (Aliphatic)	23	14
EPH CWG (Aromatic)	23	14
GRO	23	14
pH	23	14
Total Organic Carbon	23	14
Total Sulphate	23	14
Easily Liberated Sulphide	22	14
Ammoniacal Nitrogen	22	14
Asbestos ID	21	3
Asbestos Quantification	10	1

Table 3.9: Laboratory Soil Chemical Analysis		
Analysis Suite	Made Ground	Superficial Deposits
PCB 7 & WHO 12 (S) by GC MS	1	0

Metals suite (Arsenic, Boron, Cadmium, Chromium (III+VI), Copper, Lead, Mercury, Nickel, Selenium, Zinc).

EPH – Extractable Petroleum Hydrocarbons including aliphatic & aromatic carbon banded speciation.

VOC - Volatile Organic Compounds

PAH - Polycyclic Aromatic Hydrocarbons (PAHs).

PCB - Polychlorinated Biphenyls.

Asbestos (visual identification and quantification)

Table 3.9b: Laboratory Groundwater Chemical Analysis	
Analysis Suite	Number of Samples
COD, unfiltered	14
Ammoniacal Nitrogen as N	14
Ammoniacal Nitrogen as NH <sub>4</sub>	14
Nitrate as NO <sub>3</sub>	14
Phosphate as PO <sub>4</sub>	14
Sulphate	14
Metals (suite of nine dissolved metals)	14
SVOC (W) by GC MS	13
VOC (W) by GC MS	14
pH Value	14
TPH CWG (W) by GC FID	14
TPH Total (Includes EPH Total and GRO Total)	14

The laboratory soil and groundwater certificates are included as **Appendices C**.

### 3.10 Screening Criteria

Analytical soil and groundwater data reported as part of this Environmental Assessment report have been evaluated by comparison against generic assessment criteria (GAC). The selected GAC are based on the receptor assumptions associated with the proposed site use and



underlying ground conditions. These include the health of site occupants and controlled waters, which has been evaluated against a number of different end use scenarios:

- Residential with gardens,
- Residential without gardens; and
- Commercial

The main controlled water receptor is the River Thames, located immediately north of the East Site. Groundwater concentrations have therefore been compared to marine Environment Quality Standards (EQS) as a preference. Although not considered a suitable viable resource, given the limited thickness of the saturated aquifer, the groundwater in the River Terrace Gravel Formation has been compared to England Drinking Water Standards (EDWS).

GAC have been selected or derived by AECOM in accordance with the most recent UK regulatory guidance. For human health receptors, this comprises the EA's Contaminated Land Exposure Assessment (CLEA) methodology, most recently updated in January 2009. For controlled waters receptors, the prevailing technical guidance is the EA's Remedial Targets Methodology. Where criteria are unavailable based on these UK sources, they have been selected from reputable international and national agencies external to the UK. Such external sources have no Regulatory authority in the UK; however, since they are derived using risk-based techniques, they may be acceptable in the absence of UK guidelines.

In summary, analytical data have been screened against the criteria shown in **Table 3.10** and in order of preference.

Table 3.10: Summary of Adopted GAC	
Human Health	Controlled Water
Defra C4SL 12/2014	Water Supply (Water Quality) Regulations 2010
AECOM (modified LQM/CIEH S4ULs)	Drinking Water Standards (UK, 2010)
AECOM (modified EIC)	Resource Protection Values (Scottish Environmental Protection Agency, 2013)
USEPA RSL	World Health Organisation (WHO) Drinking Water Guidelines (DWG) 2011
Dutch Serious 2009	PNEC (EU REACH) - Coastal
Dutch Intervention 2009	Groundwater Target Values (Water Framework Directive 2010 (England & Wales))
	PNEC (EU REACH) - Coastal
	New Hampshire DES (2009)
	California Draft health protective concentration
	USEPA RSL (tapwater)

## 4. SITE INVESTIGATION FINDINGS

### 4.1 Ground Conditions

The stratigraphy beneath the Site has been characterised in the 2003 CRA Baseline Soil and Groundwater Investigation and the previous Dames & Moore 1995 Ground Investigation. The geology encountered during the historical site investigations included a deepening sequence of Made Ground, Superficial Deposits and London Clay.

**Table 4.1a** summarises the stratigraphy encountered during the September 2015 investigation. **Table 4.1b** summarises the stratigraphy reported in the 2003 CRA Baseline Soil and Groundwater Investigation Report. Borehole logs of the September 2015 investigation are presented in **Appendix B** and borehole logs from the previous investigations are included in the Phase 1 ESA (**Reference 1 Section 8**).

Table 4.1a: Summary of Ground Conditions Encountered during the AECOM, September 2015 Investigation					
Exploratory Hole	Depth to Bottom of Strata (m bgl)			Installation Strata	Date Completed
	Made Ground	Alluvium/ Superficial Deposits	London Clay		
BH2A	1.1	3.5*	-	None	25 August 2015
BH3A	1.5	3.0*	-	None	28 August 2015
BH4A	1.3	4*	-	None	27 August 2015
BH5A	1.8	3.0*	-	None	28 August 2015
BH7A/7B	1.2	3*	-	None	27 August 2015
BH8A	2.2	3.5*	-	None	26 August 2015
BH9A	3.3*	-	-	None	26 August 2015
BH109A	1.2	3.5*	-	None	28 August 2015
BH201/201A	1.9	5.1	6.0*	Superficial	24-25 August 2015
BH202 / BH202A	1.8*	-	-	None	24 August 2015
BH203 / BH203A	No recovery	No recovery	5*	None	20 August 2015
BH204	1.2	3.5*	-	None	21 August 2015
BH205	2.5	3.0*	-	None	21 August 2015
BH206	1.8*	-	-	None	21 August 2015
BH207	2.6	3.5*	-	None	25 August 2015
BH208 / BH208A	1.0	3.5*	-	None	25 August 2015
BH209	2.70	3.4*	-	None	25 August 2015
BH210	2.10	3.5*	-	None	26 August 2015
BH211	2.10	3.5*	-	None	26 August 2015
BH212	1.7	3.5*	-	None	27 August 2015

Table 4.1a: Summary of Ground Conditions Encountered during the AECOM, September 2015 Investigation					
Exploratory Hole	Depth to Bottom of Strata (m bgl)			Installation Strata	Date Completed
	Made Ground	Alluvium/Superficial Deposits	London Clay		
BH213	1.6	3.0*	-	None	27 August 2015
BH214 / BH214A	2.6*	-	-	None	25 August 2015

\*Denotes full thickness of strata not penetrated.  
- Strata not encountered.

The ground conditions encountered included:

- **Made Ground:** Where full penetrated, the thickness of Made Ground measured in the AECOM soil bores ranged between 1.2m and 2.6m.
- An extended thickness of made ground were measured at four locations where full penetration of Made Ground was not possible due to the presence of buried obstructions. These positions included BH9A, BH202/ BH202A, BH206 and BH214/214A. The obstructions ranged in depth from 1.8m to 3.3m bgl.
- Buried hardstandings, which were penetrated, were encountered at:
  - BH201: Concrete slab of unknown thickness at 0.7m bgl;
  - BH202: Concrete slab of unknown thickness at 0.8m bgl;
  - BH202A: Concrete slab of unknown thickness at 1.8m bgl;
  - BH203: A 0.1m thick concrete slab between 0.9m and 1.0m followed by another concrete slab of unknown thickness at 3.0m bgl;
  - BH203A: A 0.1m thick concrete slab between 0.9m and 1.0m followed by another 0.1m thick concrete slab between 3.5m and 3.6m;
  - BH206: Concrete slab of unknown thickness at 1.8m bgl;
  - BH208: Concrete slab of unknown thickness at 0.8m bgl;
  - BH214: Concrete slab of unknown thickness at 2.6m bgl;
  - BH214A: Concrete slab of unknown thickness at 2.0m bgl;
  - BH7B: Concrete slab of unknown thickness at 0.6m bgl; and
  - BH9A: Concrete slab of unknown thickness at 3.3m bgl.
- A layer of surface concrete / tarmac hardstanding was encountered at all locations with the exception of BH4A and BH5A AECOM soil bore locations (Note: two attempts at drilling were undertaken at six positions: BH7A/B, BH201/A, BH202/A, BH203/A, BH208/A and BH214/A). The underlying Made Ground generally comprised loose roadstone, red/yellow brick and concrete gravels, sand and gravels of flint and occasional reworked clay.

- **Superficial Deposits:** Generally comprising clayey, silty sand with varying gravel content with areas of soft, brown, sandy clay. The full thickness (3.2m) of the superficial deposits was proven in one AECOM 2015 botehole (BH201A) and the base of this stratum measured at 5.1m bgl.
- **London Clay:** Grey to brown clay. The top of the London Clay was encountered at 5.1m in one AECOM borehole (BH201A).

Table 4.1b: Summary of Ground Conditions Reported in the CRA, 2003 Soil & Groundwater Baseline Report					
Exploratory Hole	Depth to Bottom of Strata (m bgl)			Installation Strata	Date Completed
	Made Ground	Alluvium/Superficial Deposits	London Clay		
BH2	0.25	6.6	6.8*	Superficial	09 October 2003
BH3	0.3	6.5	6.6*	Superficial	05 October 2003
BH4	0.2	6.6	6.7*	Superficial	06 October 2003
BH5	0.5	6.9	7.0*	Superficial	05 October 2003
BH7	0.6	6.6	6.7*	Superficial	06 October 2003
BH8	0.4	7.2*	-	Superficial	06 October 2003
BH9	2.2*	-	-	Made Ground	06 October 2003
BH10	0.35	6.9	7.0*	Superficial	06 October 2003

It is noted that the Made Ground encountered during the August 2015 investigation is thicker than that reported in the 2003 baseline investigation. During the 2015 investigation works, soil cores were collected in plastic liners which allow an accurate logging of the soil. During the 2003 baseline investigation a rotary auger drilling technique was used to extract soils to the ground surface on the auger flights. This method is a less accurate sampling and logging methodology. The thicknesses of Made Ground reported in the 2015 investigation are therefore considered to be more accurate.

The base of the superficial deposits were encountered in six baseline investigation locations (2003) and to depths between 6.5m and 6.9m (with the exception of BH8, where the base of the superficial deposit was not fully penetrated by 7.2m bgl; the full depth of this borehole).

The top of the London Clay was encountered at depths between and 6.5 and 6.9m bgl at six baseline investigation locations and to a maximum depth of 7.0m bgl. The full thickness of London Clay was not proven during the investigations.

## 4.2 Field Observations

Visual and olfactory observations of note were made at the following borehole locations:

- Contractor Storage area, north portion of the West Site:
- BH4A, Possible asbestos fragments were noted in the Made Ground between ground level and 1.3m bgl.
- The Waste Storage area located in the west of the West Site:

- BH8A, Black ash was noted in the Made Ground between 0.4m and 0.8m bgl with PID readings of 2.1 parts per million (ppm) at 0.5m bgl and <0.1ppm at 1.0m bgl.

During groundwater purging and sampling no measurable free phase product was identified. In addition, no oily sheen or staining was observed and no hydrocarbon odours detected. The following visual and olfactory observations of note were made at BH9:

PID measurements of ionisable hydrocarbons were taken from soils at regular intervals during drilling. In total, 113 soil headspace measurements were undertaken. In 112 of the 113 measurements the result was less than the limit of detection of the PID (<0.1 parts per million (ppm)). One headspace measurement of 2.1ppm was measured from soil sampled from BH8A (0.5m bgl).

### 4.3 Hydrogeology

#### Groundwater Elevations

During drilling, water strikes were encountered at two of the nine locations at depths of 2.2m bgl (3.70m Above Ordnance Datum (AOD)) in BH9A and 3.7m bgl (2.27m AOD) in BH201A.

Groundwater elevation measurements from the thirteen wells located on the Site was undertaken on 28<sup>th</sup> August 2015 between 12.25pm and 13.10pm to reliably estimate the groundwater flow direction and to minimise the potential influence of the River Thames tidal effect. **Table 3** indicates groundwater level measurement data.

A static perched water level was measured at 1.75m bgl (4.025m AOD) at BH9.

Static groundwater levels within the superficial deposits were measured between 3.586m bgl in BH201A (5.575m AOD) and 5.14m bgl (6.49m AOD) at BH3.

The groundwater elevation trend from five groundwater monitoring rounds completed between 2003 and 2015 is included as appended **Graph 1**. The graph indicates that groundwater elevations are relatively consistent during the five monitoring rounds.

#### Groundwater Flow Direction

Inferred groundwater flow contours for the superficial aquifer beneath the site, based on the results of this 2015 monitoring round, are presented as **Figure 4**. The elevated groundwater levels in BH9 have been omitted from the groundwater contour evaluation as this installation is indicative of perched water in the Made Ground.

The 2015 monitoring results indicate the inferred groundwater flow direction to be to the west.

#### Tidal Effects on Groundwater Elevation

Following the groundwater elevation monitoring, three pressure transducers were installed in monitoring wells BH4, BH10 and BH201A to continuously measure groundwater elevations within the superficial deposits for a period of approximately 2.5 days and assess the tidal influence of the River Thames on the groundwater levels beneath the Site. The results are included on Graphs xxx to xxx appended to this report.

The assessment of the transducers data indicates that only the groundwater levels of the northern boundary of the East Site, represented by BH201A, is moderately affected by the tidal influence of the River Thames with daily fluctuations ranging from

approximately 40 to 60mm with a peak of approximately 120mm during the early hours of the 31st of August possibly due to rainfall. This monitoring well is located approximately 20m from the southern bank of the River Thames.

In the monitoring well BH4 located approximately 65m from the southern bank of the River Thames along the northern boundary of the West Site, the tidal effect appears to be time lagged from BH201A due to the distance from the river but not significant. The groundwater level fluctuations in this area are comparable to those detected 150m further south within the central portion of the site represented by BH10.

It is noted that from the visual inspection of the River Thames in proximity of the site, the banks are constructed with concrete and stone blocks.

## 5. LABORATORY QA/QC

### 5.1 Quality Control

The majority of laboratory analytical techniques undertaken are certified by the United Kingdom Accreditation Service (UKAS). The range of accredited analyses offered by the selected sub-contract laboratory (ALcontrol) is considered to be as comprehensive as is available from commercial laboratories in the UK. UKAS and the Environment Agency's Monitoring Certification Scheme (MCERTS) status for all analyses undertaken is shown on the laboratory certificates presented in **Appendix C**.

### 5.2 Duplicate Analysis

One duplicate groundwater sample was collected during the September 2015 sampling event from BH4 and labelled DUP01. The duplicate was tested for the same analytical suite as the primary sample and for QA/QC purposes.

The evaluation of the duplicate samples is based on the Relative Percent Difference (RPD), which is defined as:

$$RPD = 100 \times (|X1 - X2| / (X1 + X2))$$

where X1 and X2 are the values of the concentration obtained for an analyte X in the duplicate sample, and  $|X1-X2|$  is the absolute difference of X1 and X2.

Relative percentage differences (RPDs) have been calculated for chemical concentrations recorded above the method detection limits between a primary sample from BH4 and a duplicate sample (DUP01). The 'limits' of  $\pm 25\%$  for inorganic analysis and  $\pm 100\%$  for organic analyses are based on AECOM's experience from a large number of projects and should be viewed as a guideline for the expected RPD values in a water matrix. These guideline limits should be used with caution with laboratory results within ten-times the laboratory method detection limit (MDL). The RPD assessment is presented in **Table 11**.

- Elevated RPDs for inorganics were observed for copper (40%) and selenium (43%) above the guideline value of 25% for organic parameters. The elevated RPDs for these two parameters are not a significant concern given that the other eight metal parameters were within the acceptable range. In the remainder of the report the higher concentrations from either the primary or duplicate sample from BH4 will be used.
- The calculated RPDs for the remaining inorganics analysis were in the range 0 to 11% which is within the acceptable range.
- RPD assessment for the organics analysis was not possible given the results were below the analytical method detection limits.

### 5.3 Conclusion

The laboratory analytical results are considered suitable for review based on the sampling methodologies described in **Section 3.8**, the laboratory accreditation and the results of the RPD assessment.

## 6. GENERIC QUANTITATIVE RISK ASSESSMENT

### 6.1 Stage 2 Generic Assessment

Given that the final development scheme is not yet finalized, AECOM have elected screening criteria based on three possible end uses: residential without gardens, residential with gardens and commercial.

The most sensitive controlled waters receptor is considered to be the River Thames, which flows along the northern site boundary in a west to east direction and the Secondary A Aquifer within the underlying River Terrace Deposits. Further details of the selected generic assessment criteria (GAC) are given in **Section 3.10**.

### 6.2 Soil

#### 6.2.1 Heavy Metals

A total of 37 soil samples were analysed for a suite of eleven metals. The results are included in appended **Table 4**. A summary of the GAC exceedances is presented in the following Table and discussed below.

Analyte	Number of detects	GAC (mg/kg)			Range in Detected Conc. (mg/kg)	Number of GAC Exceedences			Location with Maximum Conc.
		Human Health - Res. Without Gardens	Human Health - Res. With Gardens	Human Health - Commc.		Human Health - Res. Without Gardens	Human Health - Res. With Gardens	Human Health - Commc.	
Arsenic	37	40	37	640	9.55 to 94	1	1	0	BH7A; 0.7m
Lead	37	310	200	2300	5.73 to 2,910	2	6	1	BH213, 0.6m

The concentrations of cadmium, chromium (III+VI), copper, mercury, nickel, selenium, zinc and hexavalent chromium were measured at concentration below the GAC for the three land use scenarios and are therefore not considered to represent an unacceptable risk to human health.

The detected concentrations of arsenic in the 37 samples tested ranged between 9.55mg/kg and 94mg/kg. None of these concentrations exceeded the human health GAC for a commercial end use. The measured concentration from BH7A (94mg/kg; 0.7m bgl) exceeded the GACs for both residential with and without gardens scenarios. The average arsenic concentration from the 37 samples is 19mg/kg and well below the GAC for the possible end use scenarios. Arsenic is therefore not considered to represent an unacceptable risk to human health regardless of the end use.

The detected concentrations of lead in the 37 samples tested ranged between 5.73mg/kg and 2,910mg/kg. The measured concentration from BH213 (2,910mg/kg; 0.6m bgl) exceeded the GACs for commercial use. The measured concentrations from BH208 at 0.8m, BH212 at 0.6m bgl, and BH4A at 0.9m bgl exceeded the GAC for residential with gardens and the samples from BH213 at 0.6m bgl and BH7A at 0.7m bgl exceeded the GAC for residential without gardens. The average lead concentration from the 37 samples is 156mg/kg and well below the GAC for the three possible end use scenarios.



### 6.2.2 Total Petroleum Hydrocarbons, BTEX and MTBE

A total of 37 soil samples were analysed for total petroleum hydrocarbons (TPH), BTEX and MTBE. TPH data were reported with a carbon banded aliphatic/aromatic split to enable risk assessment following the Criteria Working Group (CWG) methodology. The results are included in appended **Table 5**.

No TPH, BTEX and MTBE were detected at concentrations in excess of human health GAC for the three end use scenarios in the 37 soil samples from the Site.

### 6.2.3 Poly-cyclic Aromatic Hydrocarbons

A total of 37 soil samples were analysed for the presence of poly-cyclic aromatic hydrocarbons (PAHs). The results are included in appended **Table 5**.

The suite of PAH tests included twenty-one parameters. The PAH detections in the remaining thirty-seven samples were below the GAC for all proposed end uses with the exception of coal tar.

The detected concentrations of coal tar in the 37 samples tested ranged between <0.015mg/kg and 1.47mg/kg. None of these concentrations exceeded the human health GAC for a commercial end use.

The measured concentration from BH4A (1.47mg/kg; 0.9m bgl) exceeded the GACs for both residential with and without gardens scenarios. In addition, the concentration from two further samples from BH212 (1.05mg/kg; 0.6m) and BH7A (1.05mg/kg; 0.7m bgl) exceeded the GAC for residential without gardens end use. The average coal tar concentration from the 37 samples is 0.24mg/kg and well below the GAC for the possible end use scenarios. Coal tar is therefore not measured at unacceptable concentration widespread across the site and is not considered to represent an unacceptable risk to human health regardless of the end use.

### 6.2.4 Volatile Organic Compounds

A total of 37 soil samples were analysed for a suite of sixty-four volatile organic compounds (VOCs) parameters. The results are included in appended **Table 6**. No VOCs were detected at concentrations in excess of the MDL in the 37 soil samples analysed for these compounds.

It is noted that the MDLs for chloromethane, vinyl chloride, trichloroethene, 1,2-dichloroethane, 1,2,3-trichloropropane and 1,2-dibromo-3-chloropropane exceed GACs for human health in a residential scenario. Given that VOCs have not been measured at concentration below the MDL in the 37 samples, it is considered unlikely that these parameters represent an unacceptable risk or environmental concern.

### 6.2.5 Polychlorinated biphenyl (PCB)

One soil sample was analysed for the presence of a suite of Poly-Chlorinated Biphenyls (PCBs). The results are included in appended **Table 5**. No PCB compounds were detected at concentrations in excess of the MDL in the sample analysed for these compounds.

The laboratory MDLs for pentachlorobiphenyl, 3,3,4,4,5- (PCB 126) and hexachlorobiphenyl, 3,3,4,4,5,5- (PCB 169) exceed the associate human health residential GACs. Given that none of the PCB congeners in the suite of parameters have been measured at concentration above the MDL in this sample, it is considered

unlikely that these parameters represent an unacceptable risk or environmental concern.

### 6.2.6 Asbestos

A total of twenty-six samples of Made Ground were visually assessed at the laboratory for the presence of ACMs. The results are included in appended **Table 5**. Asbestos was visually identified (by microscope) in eight samples, including:

- BH2A (0.5m to 1.0m bgl): Amosite trace detected (loose fibres in soil);
- BH4A (0.9m bgl): Amosite and Chrysotile detected (loose fibres in soil);
- BH201A (0.7m bgl): Amosite detected;
- BH203A (0.5m bgl): Soil containing loose fibres and debris of asbestos bitumen;
- BH207 (0.7m bgl): Chrysotile detected (loose fibres in soil);
- BH208 (0.8m bgl): Chrysotile detected (loose fibres in soil);
- BH209 (0.5m bgl): Chrysotile detected (loose fibres in soil); and
- BH210 (0.8m bgl): Amosite detected.

Further quantification testing was undertaken in the laboratory on the eight samples. This quantification test indicates that the visually identified ACMs were below the hazardous waste threshold limit of <0.1% volume in the samples.

During the intrusive works, possible asbestos fragments were noted in the Made Ground of location BH4A between ground level and 1.3m bgl. There is no prescribed human health value for asbestos concentrations in soils in the UK. The system for evaluation is site-specific and dependent on site use and receptor. It is usually preferred that soils containing asbestos remain sealed in the ground and future disturbance controlled by code of construction practices.

Overall we consider that asbestos in soils is not presently an unacceptable risk for future residential and or commercial site use given the relatively low volumes measured in the samples. Future below ground works should consider the potential for asbestos to be present in Made Ground and appropriate standard construction controls adopted.

### 6.2.7 Miscellaneous Inorganic Compounds

A total of 37 soil samples were analysed for the presence of sulphide, sulphate, ammoniacal nitrogen as NH<sub>4</sub> and pH. The results are included in appended **Table 4**.

None of these parameters were measured at concentrations that exceed the human health GAC for the three end use scenarios.

### 6.3 Groundwater

Groundwater analytical data from the 2015 sampling round are presented in **Tables 7 to 10** alongside the GAC used for generic risk assessment screening purposes.

The GAC used for protection of controlled waters in this assessment have been selected as England and Wales Environmental Quality Standards (EQSs) appropriate for protection of the River Thames. Where EQSs are not available drinking water standards (DWSs) from the UK or World Health Organisation have been selected.

Exceedances of GAC are summarised below.

### 6.3.1 Metals

A total of fourteen groundwater samples were analysed for metals. The results are included in appended **Table 7**. A summary of the results is in the following Table and discussed below.

Analyte	Number of detections	GAC (µg/l)		Range in Detected Concentrations (µg/l)	Average concentration	Number of GAC Exceedences		Location with Maximum Concentration
		Controlled Waters DWS	Controlled Waters EQS			Controlled Waters DWS	Controlled Waters EQS	
Arsenic	14	10	25	3.79 - 45.4	17	8	3	BH7
Cadmium	14	5	0.2	<0.1 - 0.228	0.063	0	1	BH9
Chromium (III+VI)	14	50	0.6	1.21 - 7.52	3.1	0	14	BH9
Cobalt	14	6	3	0.262 - 11.8	3.6	3	6	BH201A
Copper	13	2000	5	0.939 - 61.3	5.5	0	1	BH9
Lead	12	25	7.2	0.028 - 22.8	1.7	--	1	BH9
Manganese	14	50	--	7.19 - 2270	691	11	0	BH111
Selenium	14	10	--	0.781 - 13.2	4.1	1	0	BH110
Silver	0	94	0.5	<1.5	<1.5	0	13	Not detected
Thallium	0	0.2	--	<0.96	<0.96	13	0	Not detected
Zinc	14	6000	40	1.27 - 280	30	0	1	BH9

The groundwater sampled from BH9 is from perched water within Made Ground and is therefore not representative of the groundwater in the underlying superficial aquifer. A total of seven of the eighteen metals exceeded the EQS and three metals exceeded the DWS in the groundwater sample from BH9. The concentrations from BH9 are omitted from the discussion below.

The concentrations of silver and thallium were below the laboratory MDL in the fourteen samples tested. However, the laboratory MDL is marginally higher than the applicable EQS and DWS.

The concentrations of cadmium, chromium, copper, lead, silver and zinc were below the drinking water standards in the fourteen samples tested. Furthermore, the concentration of manganese, selenium and thallium were below the EQS in the fourteen samples tested.

The measured concentrations of arsenic exceeded the EQS in three samples and the DWS in eight samples of the fourteen samples tested. The average concentration from the fourteen samples is 17µg/l and exceeds the DWS, but is below the EQS.

The measured concentrations of cadmium exceeded the EQS in one (BH9 (0.228µg/l)) of the fourteen samples tested. The average cadmium concentration from the fourteen samples is 0.063 µg/l and is below the EQS. None of the measured concentrations of cadmium exceed the DWS.

The measured concentrations of chromium (III & VI) exceeded the EQS in the fourteen samples tested, but did not exceed the DWS. The EQS GAC considers that the chromium detected is the more toxic chromium VI. However, the results of the analysis of soils have not detected chromium IV above the laboratory MDL in the 37 soils tested. The chromium detected in groundwater is therefore likely to be the less toxic chromium III. The application of the EQS is therefore over-conservative. In addition, the chromium concentrations are below the DWS.

The measured concentrations of cobalt exceeded the EQS in six (BH109, BH110, BH201A, BH5, BH7, BH9) of the fourteen samples tested. The measured concentrations of cobalt also exceeded the DWS in three (BH109, BH201A and BH9) of the fourteen samples tested. The average cobalt concentration from the fourteen samples is 3.6µg/l and is below the DWS (6µg/l) but exceeds the EQS (3µg/l).

EQS are not available for selenium and therefore the DWS have been adopted. The detected concentration of selenium exceeded the DWS in the groundwater sample collected from BH110. The average selenium concentration (4.1µg/l) is below the DWS (10µg/l).

The measured concentrations of manganese exceeded the DWS in eleven of the fourteen samples tested. The average concentration from the fourteen samples is 691µg/l and exceeds the DWS (50 µg/l).

The measured concentration of metals exceeded the DWS and EQS in groundwater from across the site. However, the measured concentrations are variable and in many cases are within one order of magnitude of the screening criteria. AECOM considers the metal concentrations detected to be representative of the quality of urban groundwater in a shallow perched aquifer.

The sensitivity of this aquifer is further reduced given that the aquifer does not represent a significant resource and is not within a source protection zone for an abstraction for potable use. In addition, the selected DWS GAC are applicable for groundwater at the consumers tap and after the necessary treatment for human consumption and the EQS are applicable for the quality at the receiving water. The use of these GAC is therefore considered conservative in this application.

### 6.3.2 Total Petroleum Hydrocarbons, BTEX and MTBE

A total of fourteen groundwater samples were analysed for TPH, BTEX and MTBE. The results are included in appended **Table 8**.

TPH was not measured above the laboratory MDL in eleven of fourteen samples tested. TPH was measured in samples from three monitoring wells (BH9, BH109 and BH111) at total TPH concentrations between 65.8µg/l and 1,430µg/l. DWS or EQS are not available for these compounds.

BTEX and MTBE concentrations were below the laboratory MDL in the fourteen samples tested and below the corresponding EQS and DWS.

### 6.3.3 Polycyclic Aromatic Hydrocarbons

A total of fourteen groundwater samples were analysed for a suite of 16 PAH compounds. The results are included in appended **Table 9** and summarized in the Table below.

Analyte	Number of detections	GAC (µg/l)		Range in Detected Concentrations (µg/l)	Number of GAC Exceedences		Location with Maximum Concentration
		Controlled Waters DWS	Controlled Waters EQS		Controlled Waters DWS	Controlled Waters EQS	
Anthracene	0	90	0.1	<1	--	13	All below MDL
Fluoranthene	1	4	0.1	<1 – 6.12	--	13	BH9
Benz(a)anthracene	0	0.1	--	<1	13	--	All below MDL
Chrysene	0	1	--	<1	2	--	BH9
Benzo(a) pyrene	1	0.01	0.05	<1 – 4.69	13	13	BH9
Dibenz(a,h)anthracene	0	0.01	--	<1	13	--	BH9
Benzo(b)&(k)fluoranthene	1	--	0.03	<2 – 8.42	--	13	BH9
PAHs (sum of 4)	1	0.1	--	<4 – 14.47	13	--	BH9
benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	1	--	0.002	<2 – 6.05	--	13	BH9

The concentrations of PAHs in thirteen groundwater samples from the superficial River Gravels were below the laboratory MDL (<1 to <4 µg/l).

The MDL for six PAHs are above the EQS and four PAHs above the EQS. However, the lack of PAH detections above MDL indicate that this is not a significant concern..

One groundwater sample was from groundwater perched above a concrete slab and within the Made Ground at BH9. The concentrations of fluoranthene, benzo(a)pyrene, benzo(b)&(k)fluoranthene, PAHs (sum of 4) and benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene exceed the relevant EQS and/or DWS in groundwater sampled from location BH9. These exceedances are not considered a significant concern as the detected concentrations are representative of the perched water quality and none of these parameters are measured above the GAC in groundwater from the superficial River Gravels.

### 6.3.4 Volatile Organic Compounds and Semi-volatile Organic Compounds

A total of fourteen groundwater samples were analysed for a suite of sixty-five VOC and thirteen samples were analysed for a suite of sixty SVOC parameters. The results are included in appended **Table 10**.

VOCs have not been identified in excess of the MDL in ten of the fourteen samples tested. Chlorobenzene was measured in samples from four monitoring wells (BH111, BH201A, BH7 and BH9). These results are below the DWS (300 µg/l).

SVOCs have not been identified in excess of the MDL in ten of the fourteen samples tested. 1,1,1-trichloroethane, trihalomethanes, 4-methylphenol and carbon disulfide were measured in samples from three monitoring wells (BH4, BH9 and BH111). These results are below the available EQS and DWS.

The concentration of phenol in groundwater from BH9 (10.7µg/l) exceeded the EQS (7.7µg/l), but not the DWS (5,800µg/l).

The laboratory MDL for 24 VOC & SVOC parameters exceeded the relevant EQS and/or DWS. Given the lack of detections of VOC and SVOC parameters in groundwater, this is not considered to be a significant concern.

### 6.3.5 Miscellaneous Inorganic Compounds

The miscellaneous inorganic suite included nitrate (as NO<sub>3</sub>-), phosphate, ammoniacal nitrogen as N, ammoniacal nitrogen (as NH<sub>4</sub>), sulphate, COD and pH. The results are included in appended **Table 7**.

The groundwater pH at the Site ranged between 7.10 and 8.09 indicating slightly alkaline groundwater conditions.

Nitrate was not detected above the laboratory MDL (<0.3 mg/l) in two of the fourteen samples tested. The concentration of nitrate in twelve groundwater samples ranged between 0.94 and 21.9mg/l. The nitrate concentrations in these samples do not exceed the DWS (50 mg/l).

Phosphate was not detected above the laboratory MDL (<0.05 mg/l) in two of the fourteen samples tested. The concentration of phosphate in twelve groundwater samples ranged between 0.056 and 14.1mg/l. EQS or DWS are not available for this compound.

Sulphate was not detected above the laboratory MDL (<2 mg/l) in one of the fourteen samples tested. The concentration of sulphate in thirteen groundwater samples ranged between 37.5 and 457mg/l. EQS or DWS are not available for this compound.

Ammoniacal nitrogen was not detected above the laboratory MDL (<0.2 mg/l) in seven of the fourteen samples tested. The concentration of ammoniacal nitrogen in seven groundwater samples ranged between 0.508 and 5.66mg/l. The ammoniacal nitrogen concentration in six of these samples exceeded the DWS (0.389 mg/l). The most elevated concentration of ammoniacal nitrogen was measured in groundwater perched within the Made Ground at BH9. The average ammoniacal nitrogen concentration from groundwater sampled from the superficial River Gravels was 0.67mg/l and marginally exceeds the DWS.

COD was not detected above the laboratory MDL (<7 mg/l) in six of the fourteen samples tested. The concentration of COD in eight groundwater samples ranged between 8.09 and 3,330mg/l. EQS or DWS are not available for this compound.

## **7. CONCLUSIONS**

### **7.1 General Site Description**

This report presents the findings of a Phase 2 ESA at the Stag Brewery Mortlake facility, Mortlake, London, SW14 7ET. The Stag Brewery has been used for the production and packaging of alcoholic beverages since the late 1850s. However, the Stag Brewery will cease manufacturing operations in 2015 and the site is to be divested for redevelopment. The objective of this report is to present an assessment of the environmental ground conditions at the Site.

The site investigation undertaken included the drilling of two boreholes with a groundwater monitoring well installations to supplement the existing network of thirteen groundwater monitoring wells installed during previous phases of investigation. Twenty-eight soil bores were also drilled across the Site to provide a higher density of exploratory points, better understand the ground conditions and collect soil samples for laboratory chemical analysis.

### **7.2 Site Characterisation Findings**

#### **Ground Conditions**

The ground conditions at the site were assessed from twenty-eight soil bores were drilled using dynamic percussive drilling techniques to a maximum depth of 5.0m bgl. The drilling work was undertaken between 20 and 28 August 2015. The deepening sequence of geology encountered in the site investigation includes Made Ground, superficial deposits of River Terrace Gravels and London Clay bedrock.

Made Ground is between 1.2m and 2.6m thick and comprised loose roadstone, red/yellow brick and concrete gravels, sand and gravels of flint and occasional reworked clay. Buried obstructions, thought to represent relict concrete slabs, were encountered at eleven locations.

The boundary between the River Terrace Deposits and London Clay was encountered at depths between 6.5 and 6.9m bgl. The London Clay was encountered to the maximum depth of drilling (7.0 bgl).

#### **Hydrogeology**

Groundwater elevation monitoring on 28 August 2015 indicated the groundwater to be between 3.57 and 5.14 mbgl. Groundwater flow direction is inferred to be west. The tidal effects of the River Thames were measured in three boreholes across the site by continuous monitoring over 2.5 days. The results indicated a maximum fluctuation of 60mm in a well 20m from the River Thames. However, no measurable effect on groundwater elevation was recorded on the two wells located 65m and 200m from the River Thames.

#### **Soil Quality**

No obvious visual or olfactory evidence of hydrocarbon contaminated soils was noted from the drilling arisings. Furthermore, only one result (2.1ppm) out of 113 screening tests performed was above the detection limit (<0.1ppm) of the Photo-Ionisation Detector (PID) equipment during soil headspace monitoring.

A total of 25 samples of Made Ground and 14 samples of natural ground were analysed at Alcontrol Laboratories for a suite of inorganic and organic chemical parameters. The results were compared to generic assessment criteria (GAC) suitable for three end use scenarios: residential with gardens, residential without gardens and commercial. The comparison

indicated that the soil chemistry does not represent an unacceptable risk to human health regardless of the end use scenario.

**Asbestos Containing Materials (ACMs):** During the site investigation suspected ACMs were observed as fragmented tiles from one exploratory hole (BH4A between ground level and 1.3m bgl). A total of twenty-six samples of Made Ground were also visually screened at the analytical laboratory and asbestos fibres were observed in eight samples. Asbestos quantification analysis on the eight samples measured a concentration of ACMs <0.1% and below hazardous waste criteria.

Overall we consider that asbestos in soils is not presently an unacceptable risk for future residential and or commercial site use given the relatively low volumes measured in the samples. Future below ground works should consider the potential for asbestos to be present in Made Ground and appropriate standard construction controls adopted.

### **Groundwater Quality**

During groundwater monitoring no obvious visual or olfactory indication of contamination was identified from the sampled groundwater. A total of fourteen groundwater samples were analysed at Alcontrol Laboratories for a suite of inorganic and organic chemical parameters. The results were compared to GAC protective of the adjacent River Thames (marine Environmental Quality Standards) and England Drinking Water Standards. The comparison indicated that the majority of chemical parameters were below the relevant GAC and although some minor exceedances were measured at isolated locations, the groundwater quality is considered commensurate with that in an urban environment.

## **7.3**

### **Conclusions**

The site characterization has not encountered soil and groundwater conditions that represent a constraint to redevelopment of the Site for mixed commercial and residential use above what would normally be expected from previously developed land.

The chemical analysis of the Site soils and groundwater has not identified concentrations that represent an environmental risk to human health or controlled waters. No environmental improvement works are considered necessary at the Site based on a mixed use development scheme.

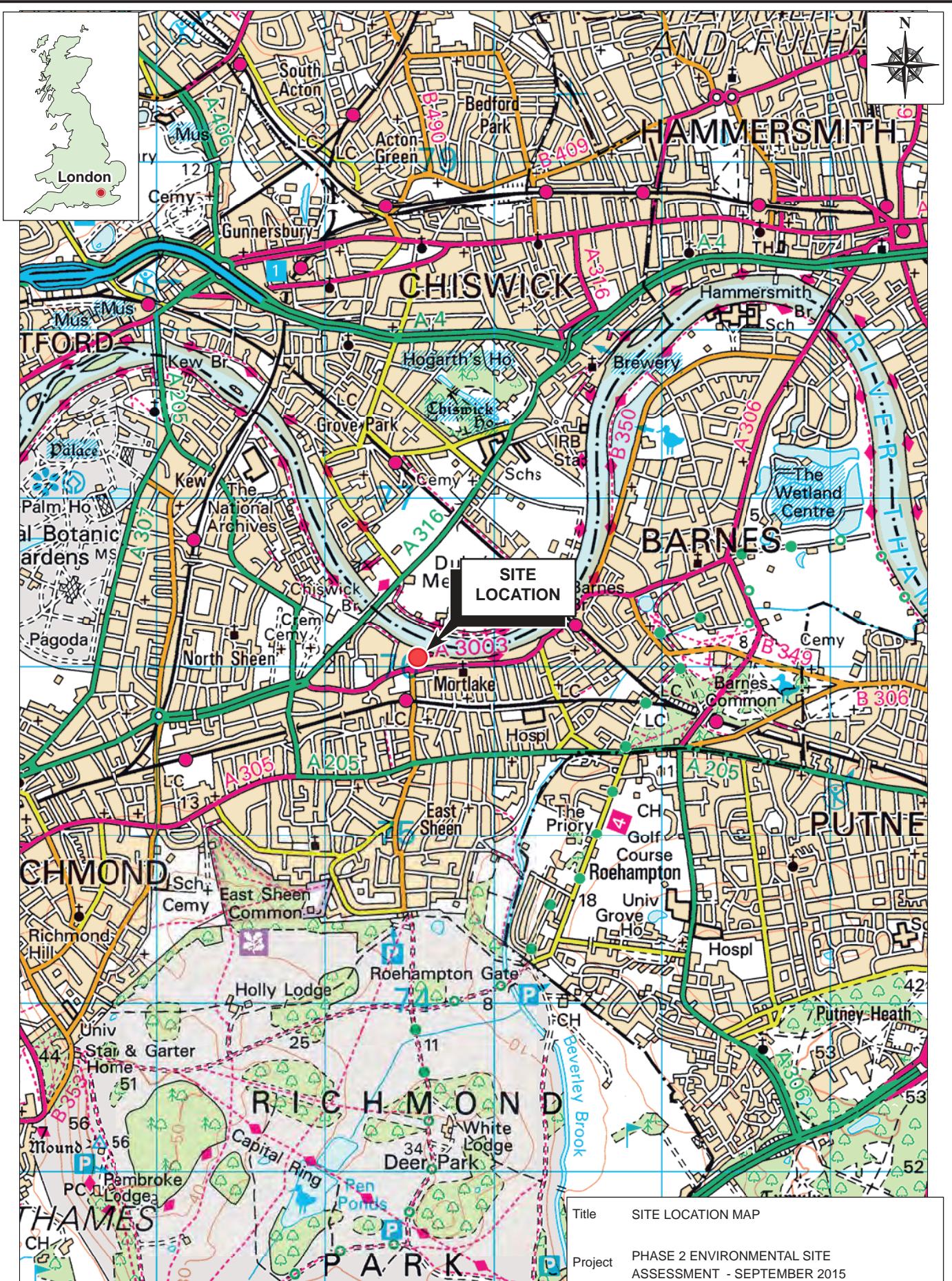
It is likely that works to remove relict buried foundations and slabs will be required to allow construction of deep structures and foundations. Furthermore, it is unlikely that the physical composition of the existing shallow Made Ground soils will be of suitable composition for use in soft planted areas. Imported soils are therefore likely to be required for soft planting and landscaping.



**8. REFERENCES**

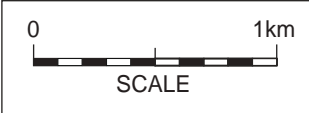
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## FIGURES



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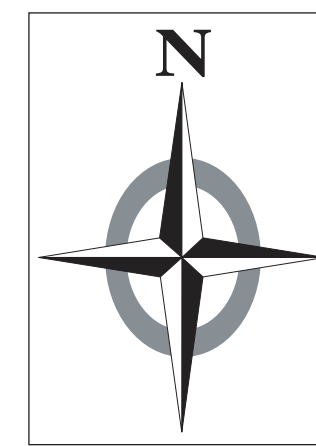
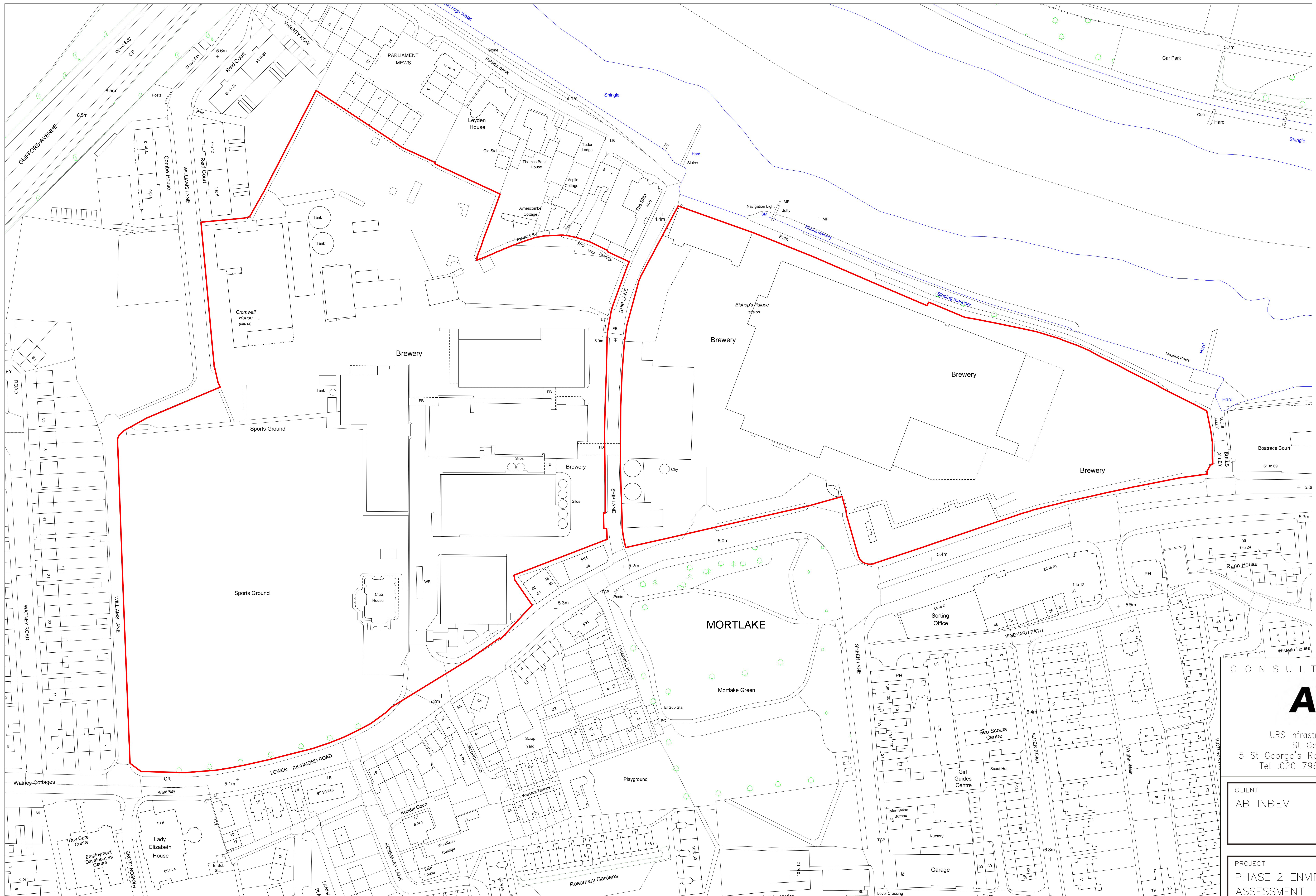


Title SITE LOCATION MAP

Project PHASE 2 ENVIRONMENTAL SITE ASSESSMENT - SEPTEMBER 2015

Client AB INBEV

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	FINAL		Ref: MM/AM/WIMB
	Scale: AS SHOWN		Job No: 47074683
	Drg. Size: A4		<b>FIGURE 1</b>



SITE BOUNDARY

CONSULTING ENGINEERS



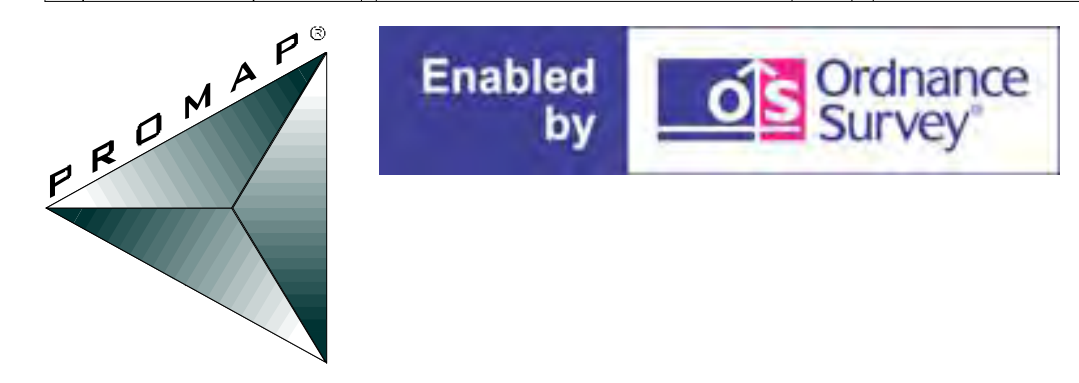
URS Infrastructure & Environment UK LTD,  
 St George's House, 3rd Floor  
 5 St George's Road, Wimbledon, London SW19 4DR  
 Tel :020 7963 9800 Fax: 020 7963 9801

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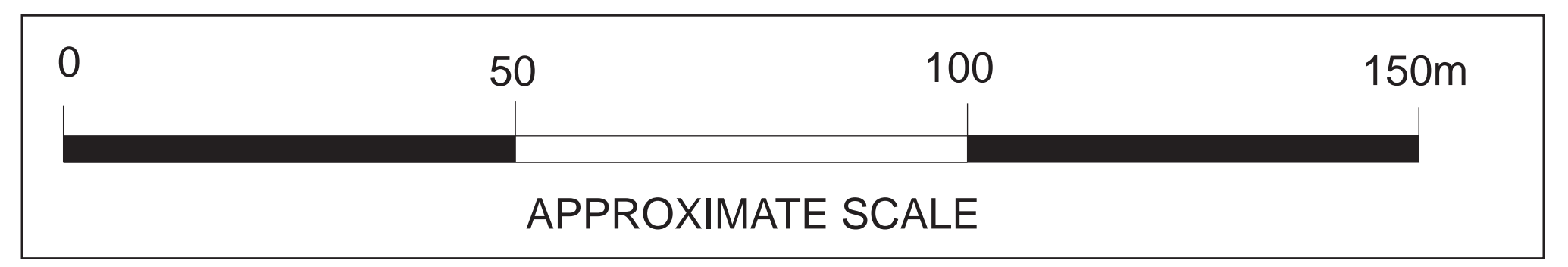
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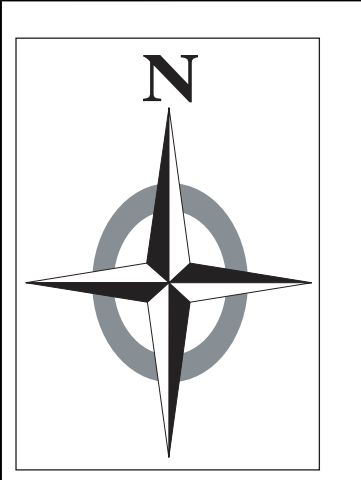
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 FIGURE 2 – SITE LAYOUT PLAN

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**AREA KEY**

- CRA, 2003 & DAMES & MOORE, 1995 GROUNDWATER MONITORING NETWORK
- EXPLORATORY HOLE LOCATION - AECOM SEPTEMBER 2015
- BH201A - ADDITIONAL GROUNDWATER WELL - AECOM 2015

**CRA, 2003 LOCATION SUMMARY**

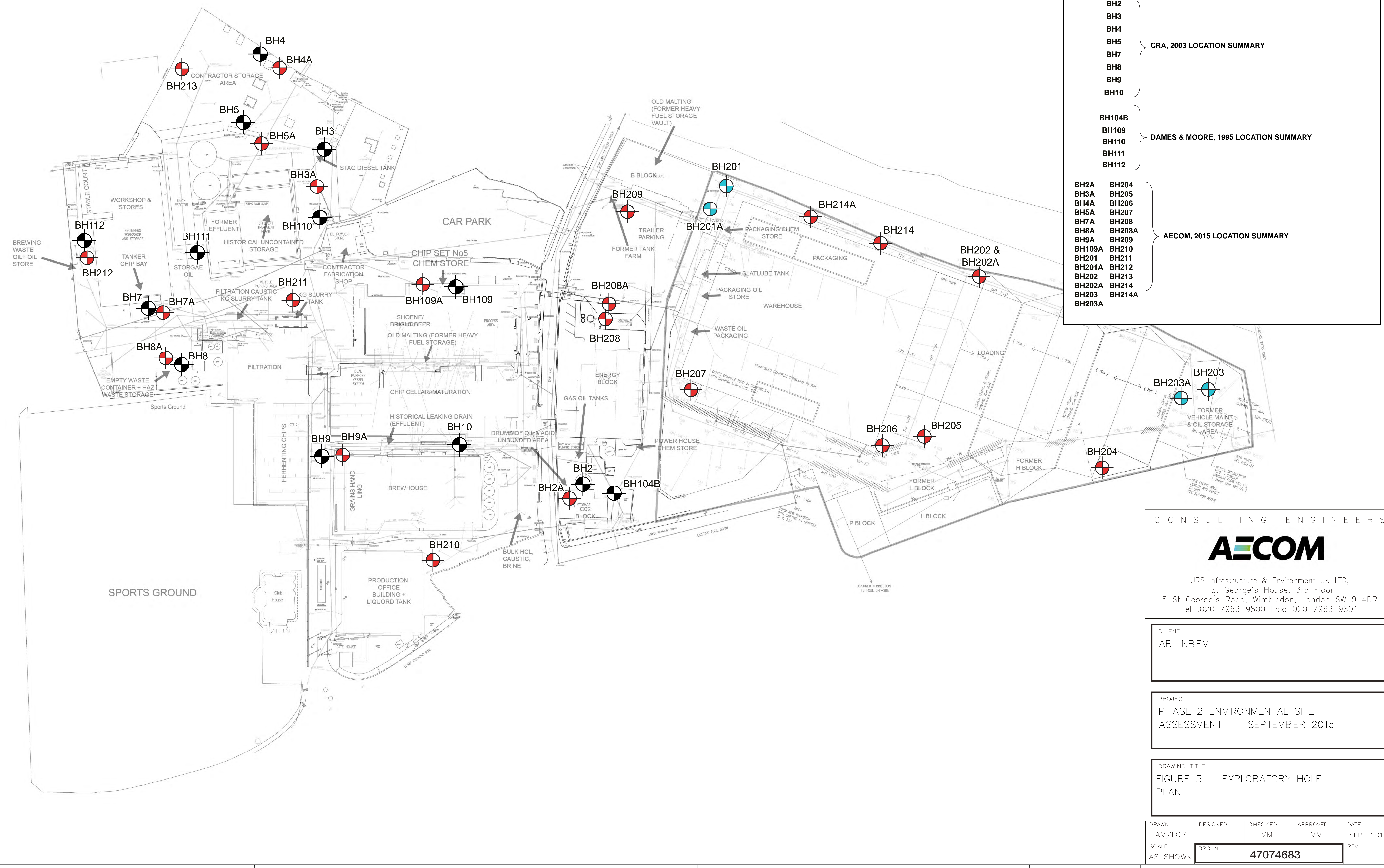
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**DAMES & MOORE, 1995 LOCATION SUMMARY**

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- BH111
- BH112

**AECOM, 2015 LOCATION SUMMARY**

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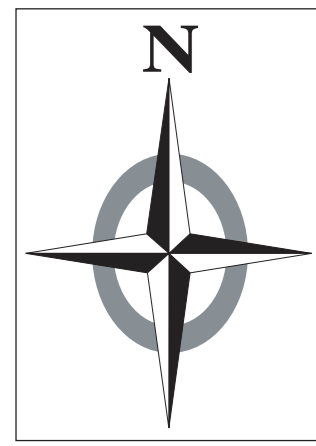
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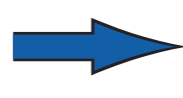
PROJECT  
 PHASE 2 ENVIRONMENTAL SITE  
 ASSESSMENT - SEPTEMBER 2015

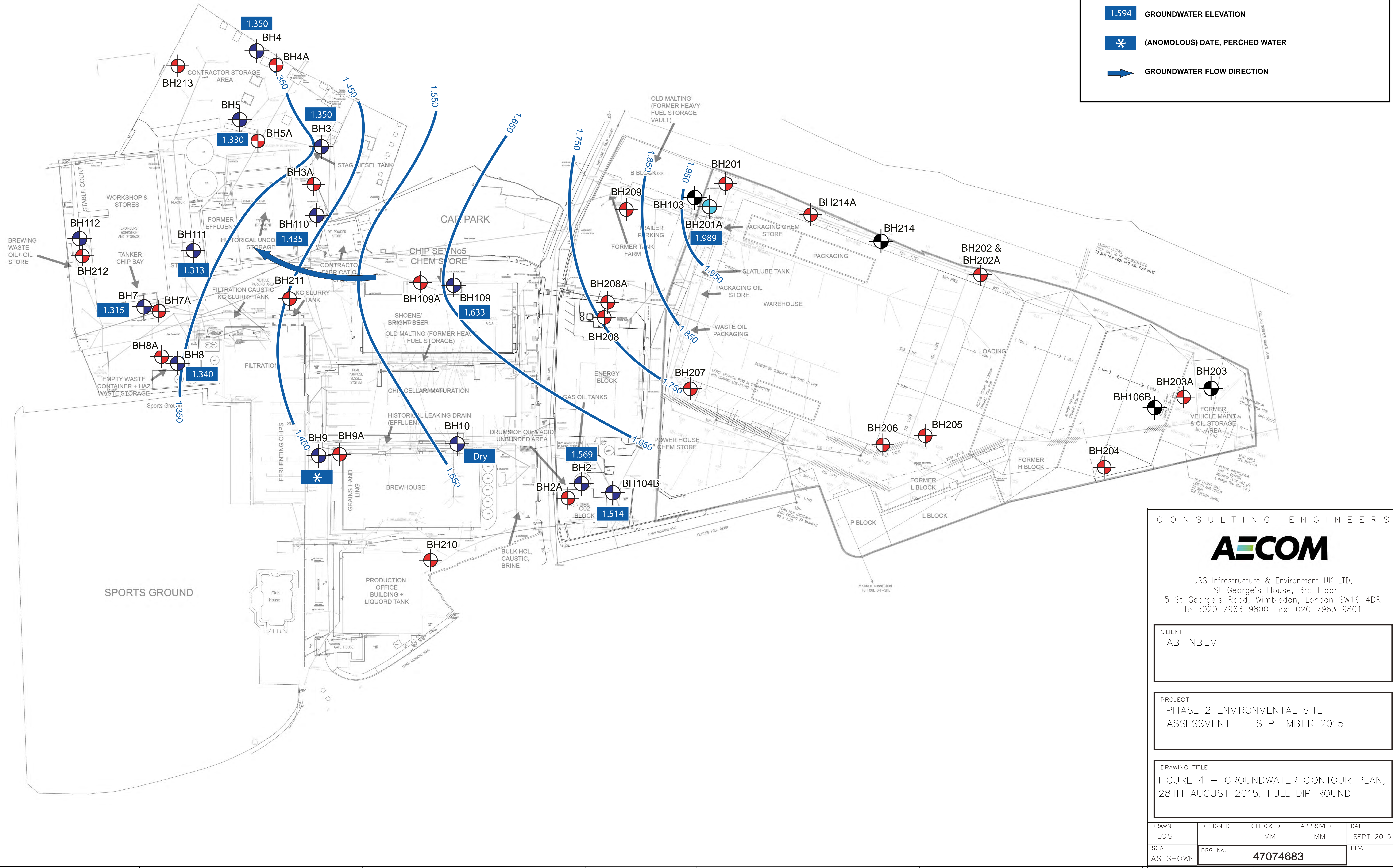
DRAWING TITLE  
 FIGURE 3 - EXPLORATORY HOLE  
 PLAN

DRAWN AM/LCS	DESIGNED	CHECKED MM	APPROVED MM	DATE SEPT 2015
SCALE AS SHOWN	DRG No. <b>47074683</b>			REV.



**AREA KEY**

-  GROUNDWATER MONITORING WELL NETWORK - DAMES & MOORE, 1995 & CRA, 2003
-  BH201A, ADDITIONAL GROUNDWATER MONITORING WELL - AECOM 2015
-  1.950 GROUNDWATER CONTOUR
-  1.594 GROUNDWATER ELEVATION
-  (ANOMOLOUS) DATE, PERCHED WATER
-  GROUNDWATER FLOW DIRECTION



CONSULTING ENGINEERS



URS Infrastructure & Environment UK LTD,  
 St George's House, 3rd Floor  
 5 St George's Road, Wimbledon, London SW19 4DR  
 Tel :020 7963 9800 Fax: 020 7963 9801

CLIENT  
 AB INBEV

PROJECT  
 PHASE 2 ENVIRONMENTAL SITE  
 ASSESSMENT - SEPTEMBER 2015

DRAWING TITLE  
 FIGURE 4 - GROUNDWATER CONTOUR PLAN,  
 28TH AUGUST 2015, FULL DIP ROUND

DRAWN LCS	DESIGNED MM	CHECKED MM	APPROVED MM	DATE SEPT 2015
SCALE AS SHOWN	DRG. No. <b>47074683</b>			REV.

## TABLES





Table 2 - Groundwater Sampling Schedule

Sample ID	BH2	BH3	BH4	BH5	BH7	BH8	BH9	BH10	
Sampling Date	02/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015	01/09/2015	
Scheduled Chem. Group	Total Analyses								
Toxic 9 Metals Filtered (W)	7	1	1	1	1	1	1	1	
COD, unfiltered	7	1	1	1	1	1	1	1	
Ammoniacal Nitrogen as N	7	1	1	1	1	1	1	1	
Ammoniacal Nitrogen as NH4	7	1	1	1	1	1	1	1	
Nitrate as NO3	7	1	1	1	1	1	1	1	
Phosphate (ortho) as PO4	7	1	1	1	1	1	1	1	
Sulphate	7	1	1	1	1	1	1	1	
Boron (diss.filt)	7	1	1	1	1	1	1	1	
Metals Prep	7	1	1	1	1	1	1	1	
VOC (W) by GC MS	7	1	1	1	1	1	1	1	
pH Value	7	1	1	1	1	1	1	1	
TPH Total (Includes EPH Total and GRO Total)	7	1	1	1	1	1	1	1	
BTEX & MTBE	7	1	1	1	1	1	1	1	

Sample ID	BH104B	BH109	BH110	BH111	BH201A	DUP01 (BH4)
Sampling Date	02/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015	01/09/2015
Scheduled Chem. Group	Total Analyses					
Toxic 9 Metals Filtered (W)	6	1	1	1	1	1
COD, unfiltered	6	1	1	1	1	1
Ammoniacal Nitrogen as N	6	1	1	1	1	1
Ammoniacal Nitrogen as NH4	6	1	1	1	1	1
Nitrate as NO3	6	1	1	1	1	1
Phosphate (ortho) as PO4	6	1	1	1	1	1
Sulphate	6	1	1	1	1	1
Boron (diss.filt)	6	1	1	1	1	1
Metals Prep	6	1	1	1	1	1
VOC (W) by GC MS	5	1	1	1	1	0
pH Value	6	1	1	1	1	1
TPH Total (Includes EPH Total and GRO Total)	6	1	1	1	1	1
BTEX & MTBE	6	1	1	1	1	1

Table 3 - Field Observations of Fluid Levels in Wells and Groundwater Quality

Well ID	Date	Depth to NAPL [m bgl]	Depth to Water (DTW) [m bgl]	Depth to Bottom (DTB) [m bgl]	Relative Elevation of Well Cover [m AOD]	Relative Elevation of Top of Well Casing [m AOD]	Relative Elevation of Water Level [m AOD]	O.d.P [mV]	Temperature [deg C]	pH	Conductivity [µS/cm @ 25C]	Dissolved Oxygen [%]	Sampling Method	Comments	
BH2	Oct 2003 - 1st Round (BASELINE EVENT)	--	5.2	6.7	5.82	5.69	--	--	--	--	--	--	No Info. Provided.	Data from CRA 2003 borehole log. NVO.	
	Dec 2005 - 2nd Round	--	4.18	6.88			--	--	--	--	--	--	--	HDPE Bailer	Good yield. Recovered purged water observed to be clear. NVO.
	Apr 2007 - Third Round	--	4.08	6.98			--	--	--	--	--	--	--	HDPE Bailer	Good yield. Recovered purged water observed to be clear with no streaks or odour. NVO.
	Sep 2012 - Fourth Round	--	4.4	6.84			--	--	--	--	--	--	--	HDPE Bailer	Dark brown for first 5L. Organic matter and orange colouring from 5L to 24L purge. Slight oil sheen noted.
	Sep 2015 - Fifth Round	--	4.121	6.764			1.569	-107.1	14.7	6.82	1609	0.374	Peristaltic Pump	Well de-silted. Light brown turning clear after approx. 3L. NVO.	
BH3	Oct 2003 - 1st Round (BASELINE EVENT)	--	5.5	6.5	6.55	6.49	--	--	--	--	--	--	No Info. Provided.	Data from CRA 2003 borehole log. NVO.	
	Dec 2005 - 2nd Round	--	5.27	6.18			--	--	--	--	--	--	--	HDPE Bailer	Good yield. Water brown in colour. Some very fine, white possibly living organisms noted. NVO.
	Apr 2007 - Third Round	--	4.91	5.94			--	--	--	--	--	--	--	HDPE Bailer	Good yield. Initially slightly grey in colour with small amount of organic matter. Cleared after initial 20L to become brown in colour. No streaks or odour.
	Sep 2012 - Fourth Round	--	5.23	5.38			--	--	--	--	--	--	--	HDPE Bailer	Dark brown/black purge water, lots of organic material in water. NVO.
	Sep 2015 - Fifth Round	--	5.14	6.035			1.35	-81	15.1	6.88	1449	0.946	Peristaltic Pump	Well de-silted. Light brown turning clear after approx. 1L. NVO.	
BH4	Oct 2003 - 1st Round (BASELINE EVENT)	--	4.8	6.7	6.21	6.18	--	--	--	--	--	--	No Info. Provided.	Data from CRA 2003 borehole log. NVO.	
	Dec 2005 - 2nd Round	--	4.96	6.31			--	--	--	--	--	--	--	HDPE Bailer	Good yield to final purge volume of 40L. No odour. Slight oily sheen on water surface.
	Apr 2007 - Third Round	--	4.72	6.23			--	--	--	--	--	--	--	HDPE Bailer	Good yield. NVO.
	Sep 2012 - Fourth Round	--	4.9	4.95			--	--	--	--	--	--	--	--	No sample obtainable - insufficient water volume.
	Sep 2015 - Fifth Round	--	4.83	6.169			1.35	32.8	15	6.6	522	5.61	Peristaltic Pump	Well de-silted. Light brown turning clear after approx. 0.5L. NVO.	
BH5	Oct 2003 - 1st Round (BASELINE EVENT)	--	5	7	6.185	6.085	--	--	--	--	--	--	No Info. Provided.	Data from CRA 2003 borehole log. NVO.	
	Dec 2005 - 2nd Round	--	4.94	6.47			--	--	--	--	--	--	--	HDPE Bailer	Good yield. NVO.
	Apr 2007 - Third Round	--	4.57	6.23			--	--	--	--	--	--	--	HDPE Bailer	Good yield. NVO.
	Sep 2012 - Fourth Round	--	Dry	4.87			--	--	--	--	--	--	--	--	No sample obtainable - insufficient water volume.
	Sep 2015 - Fifth Round	--	4.755	6.07			1.33	25.5	16.1	6.73	775	1.518	Peristaltic Pump	Well de-silted. Light brown turning clear after approx. 0.5L. NVO.	
BH7	Oct 2003 - 1st Round (BASELINE EVENT)	--	5.3	6.7	6.45	6.425	--	--	--	--	--	--	No Info. Provided.	Data from CRA 2003 borehole log. NVO.	
	Dec 2005 - 2nd Round	--	5.07	6.84			--	--	--	--	--	--	--	HDPE Bailer	Good yield. Clear grey water. NVO.
	Apr 2007 - Third Round	--	4.93	6.84			--	--	--	--	--	--	--	HDPE Bailer	Good yield. Clear grey water. NVO.
	Sep 2012 - Fourth Round	--	5.21	6.49			--	--	--	--	--	--	--	HDPE Bailer	No comments provided.
	Sep 2015 - Fifth Round	--	5.11	6.947			1.315	-98.6	16.8	7.09	1707	0.539	Peristaltic Pump	Well de-silted. Clear water NVO.	

Table 3 - Field Observations of Fluid Levels in Wells and Groundwater Quality

Well ID	Date	Depth to NAPL [m bgl]	Depth to Water (DTW) [m bgl]	Depth to Bottom (DTB) [m bgl]	Relative Elevation of Well Cover [m AOD]	Relative Elevation of Top of Well Casing [m AOD]	Relative Elevation of Water Level [m AOD]	O.d.P [mV]	Temperature [deg C]	pH	Conductivity [µS/cm @ 25C]	Dissolved Oxygen [%]	Sampling Method	Comments		
BH8	Oct 2003 - 1st Round (BASELINE EVENT)	--	4.9	7.2	6.2	6.155	--	--	--	--	--	--	No Info. Provided.	Data from CRA 2003 borehole log. NVO.		
	Dec 2005 - 2nd Round	--	4.86	6.34			--	--	--	--	--	--	--	--	HDPE Bailer	Good yield. Slight oil streak observed on the water surface of the first 10L that were removed. No oil streaks were observed on the purge water removed thereafter.
	Apr 2007 - Third Round	--	4.88	6.39			--	--	--	--	--	--	--	--	HDPE Bailer	Good yield. NVO.
	Sep 2012 - Fourth Round	--	4.95	6.25			--	--	--	--	--	--	--	--	HDPE Bailer	No comments provided.
	Sep 2015 - Fifth Round	--	4.815	6.822			1.34	4.4	15.2	6.74	1350	1.793	Peristaltic Pump	Well de-silted. Clear water. NVO.		
BH9	Oct 2003 - 1st Round (BASELINE EVENT)	--	1.9	2.2	5.9	5.775	--	--	--	--	--	--	No Info. Provided.	Data from CRA 2003 borehole log. NVO.		
	Dec 2005 - 2nd Round	--	--	--			--	--	--	--	--	--	--	--	--	No information reported by CRA.
	Apr 2007 - Third Round	--	--	--			--	--	--	--	--	--	--	--	--	No information reported by CRA.
	Sep 2012 - Fourth Round	--	--	--			--	--	--	--	--	--	--	--	--	No information reported by CRA.
	Sep 2015 - Fifth Round	--	1.75	2.497			4.025	-138.7	24.5	7.45	1544	0.374	Peristaltic Pump	Well de-silted. Black water turning grey after approx. 1L purge. Black sediments noted with organic odour. No sheen noted. Well turned dry after approx. 2L purge. Sample collected after approx. 50mins recharge. Shallow groundwater well within the Perched Water.		
BH10	Oct 2003 - 1st Round (BASELINE EVENT)	--	5	7	5.94	5.835	--	--	--	--	--	--	No Info. Provided.	Data from CRA 2003 borehole log. NVO.		
	Dec 2005 - 2nd Round	--	4.41	7.13			--	--	--	--	--	--	--	--	HDPE Bailer	Recovered purge water observed as grey and clear. NVO.
	Apr 2007 - Third Round	--	4.39	7.17			--	--	--	--	--	--	--	--	HDPE Bailer	Good yield. Clear grey groundwater. NVO.
	Sep 2012 - Fourth Round	--	4.96	5.53			--	--	--	--	--	--	--	--	HDPE Bailer	Continuous slight orange colour during purge. NVO.
	Sep 2015 - Fifth Round	--	4.277	7.031			1.558	24.6	15.5	6.8	748	0.55	Peristaltic Pump	Well de-silted. Light brown water turning clear after approx. 3L purge. NVO.		
BH104B	Oct 2003 - 1st Round (BASELINE EVENT)	--	4	6	5.81	5.715	--	--	--	--	--	--	No Info. Provided.	Data from Dames & Moore 1995 borehole log. NVO.		
	Dec 2005 - 2nd Round	--	4.13	5.09			--	--	--	--	--	--	--	--	HDPE Bailer	Good yield. Brown in colour. Some oily streaks were initially observed on surface water but cleared after 20L.
	Apr 2007 - Third Round	--	4.12	5.89			--	--	--	--	--	--	--	--	HDPE Bailer	Good yield. Brown in colour. NVO.
	Sep 2012 - Fourth Round	--	4.39	5.92			--	--	--	--	--	--	--	--	HDPE Bailer	Light orange in the first 2L of purge, clear thereafter to 14L. NVO.
	Sep 2015 - Fifth Round	--	4.141	4.931			1.574	-88.6	15.7	6.84	1153	1.067	Peristaltic Pump	Well de-silted. Clear water NVO.		
BH109	Oct 2003 - 1st Round (BASELINE EVENT)	--	4.500	6	6.28	6.14	--	--	--	--	--	--	No Info. Provided.	Data from Dames & Moore 1995 borehole log. NVO.		
	Dec 2005 - 2nd Round	--	--	--			--	--	--	--	--	--	--	--	--	No information reported by CRA.
	Apr 2007 - Third Round	--	4.400	6.18			--	--	--	--	--	--	--	--	--	No information reported by CRA.
	Sep 2012 - Fourth Round	--	--	--			--	--	--	--	--	--	--	--	--	No information reported by CRA.
	Sep 2015 - Fifth Round	--	4.507	6.142			1.633	-68.9	12.5	7.1	1409	4.686	Peristaltic Pump	Well de-silted. Light brown water turning clear after approx. 1.5L. NVO		
BH110	Oct 2003 - 1st Round (BASELINE EVENT)	--	4.600	5.6	6.3	6.24	--	--	--	--	--	--	No Info. Provided.	Data from Dames & Moore 1995 borehole log. NVO.		
	Dec 2005 - 2nd Round	--	4.880	5.52			--	--	--	--	--	--	--	--	HDPE Bailer	Good yield. Some very fine white possible live organisms observed. Pipe installation too marrow to use standard bailer. Sampled directly from HDPE pipe. No streaks or odour.
	Apr 2007 - Third Round	--	4.650	5.49			--	--	--	--	--	--	--	--	HDPE Bailer	Good yield. Initially slightly grey in colour with small amount of organic matter. Cleared after initial 30L to become brown in colour. NVO.
	Sep 2012 - Fourth Round	--	4.960	5.53			--	--	--	--	--	--	--	--	HDPE Bailer	Dark brown colour, clearing up throughout purge. NVO.
	Sep 2015 - Fifth Round	--	4.805	5.516			1.435	-18.4	17.2	6.99	1183	1.991	Peristaltic Pump	Well de-silted. Clear water NVO.		

Table 3 - Field Observations of Fluid Levels in Wells and Groundwater Quality

Well ID	Date	Depth to NAPL [m bgl]	Depth to Water (DTW) [m bgl]	Depth to Bottom (DTB) [m bgl]	Relative Elevation of Well Cover [m AOD]	Relative Elevation of Top of Well Casing [m AOD]	Relative Elevation of Water Level [m AOD]	O.d.P [mV]	Temperature [deg C]	pH	Conductivity [µS/cm @ 25C]	Dissolved Oxygen [%]	Sampling Method	Comments	
BH111	Oct 2003 - 1st Round (BASELINE EVENT)	--	4.900	7.6 (*)	6.45	6.41	--	--	--	--	--	--	No Info. Provided.	Data from Dames & Moore 1995 borehole log. NVO.	
	Dec 2005 - 2nd Round	--	5.090	7.53			--	--	--	--	--	--	--	HDPE Bailer	Initial purged water recovered dark brown / black. Soon cleared on purging. Purged then left overnight before purging again. Total purged volume 150L. Some sand recovered from well during purging. NVO.
	Apr 2007 - Third Round	--	4.880	7.58			--	--	--	--	--	--	--	HDPE Bailer	Initial purged water recovered dark grey. Soon cleared on purging. NVO.
	Sep 2012 - Fourth Round	--	5.220	7.59			--	--	--	--	--	--	--	HDPE Bailer	Orange colour throughout purge. NVO.
	Sep 2015 - Fifth Round	--	5.097	7.653			1.313	-132.6	15.9	6.97	1486	0.44	Peristaltic Pump	Well de-silted. Clear water. NVO.	
BH112	Oct 2003 - 1st Round (BASELINE EVENT)	--	Dry	3	6.35	6.305	--	--	--	--	--	--	No Info. Provided.	Data from Dames & Moore 1995 borehole log. NVO.	
	Dec 2005 - 2nd Round	--	1.19	--			--	--	--	--	--	--	--	--	No information reported by CRA.
	Apr 2007 - Third Round	--	Dry	2.67			--	--	--	--	--	--	--	--	Well dry. Sample not collected.
	Sep 2012 - Fourth Round	--	--	--			--	--	--	--	--	--	--	--	Well not located.
	Sep 2015 - Fifth Round	--	Dry	2.766			--	--	--	--	--	--	--	--	Dry. NVO.
BH201A	Sep 2015	--	3.586	5.559	5.72	5.575	1.989	-52.7	15.7	7.14	900	0.638	Peristaltic Pump	Light brown water turning clear after approx. 2L purge. NVO.	

Table 4 - Metals and Inorganics

Table with columns: Chemical Gr, Chemical Name, Unit, EQL, GAC, HH, C, OM, IND, SA, ND, 1.45, 3.48%TOC, GAC, HH, RES+PL, S, AND, 1.45, 3.48%TOC, GAC, HH, RE, S, PL, SAND, 1.4, 5-3.48%TOC, and 30 columns of sample data (Sample Depth, BH201A, BH201A, BH202A, BH203A, BH204, BH204, BH205, BH205, BH206, BH207, BH207, BH208A, BH208A, BH209, BH209, BH210, BH210, BH211, BH211, BH212, BH212, BH213, BH213, BH214, BH214, BH2A, BH2A, BH2A, BH2A, BH3A, BH3A, BH4A, BH4A, BH4A, BH5A, BH5A, BH5A, BH7A, BH7A, BH7A, BH8A, BH8A, BH8A, BH9A, BH9A, BH9A).

Key
XXX Exceedance of HH Soil Commercial/Industrial Sand, TOC >=1.45 to <3.48%
XXX Exceedance of HH Soil Residential with Plant Uptake, Sand, TOC >=1.45 to <3.48%
XXX Exceedance of HH Soil Residential without Plant Uptake, Sand, TOC >=1.45 to <3.48%

Comments
GAC: Generic Assessment Criteria
(blank): No assessment criteria available
- : Not analysed

- #1 USEPA RSL
#2 Dutch Serious 2009
#3 Dutch Intervention 2009
#4 Defra C4SL 12/2014
#5 AECOM (modified LQM/CIH S4ULS)
#6 AECOM (modified EIC)





Table 7 - Metals and Inorganics Concentrations in Groundwater

Analyte	Units	EQL	DWS GAC	EQS Coastal GAC	Well ID	BH2	BH3	BH4	BH5	BH7	BH8	BH9	BH10	BH104B	BH109	BH110	BH111	BH201A	DUP01 (BH4)	
					Date Sampled	02/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015	01/09/2015	02/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015	01/09/2015
<b>Metals</b>	Antimony (Filtered)	µg/L	0.16	5#1		0.171	0.415	0.36	<0.16	0.681	0.726	2.06	0.27	0.172	0.64	0.464	0.199	0.306	0.816	
	Arsenic (Filtered)	µg/L	0.12	10#1	25#4	39.4	7.32	5.08	5.12	45.4	15.7	14.4	3.79	17.3	32.6	14	22	6.51	4.8	
	Barium (Filtered)	µg/L	0.03	700#3		116	64.2	22.1	47.9	73.4	83.4	39.9	15.4	66	18.2	40.7	104	79.1	21.4	
	Beryllium (Filtered)	µg/L	0.07	25#5		<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	
	Boron (Filtered)	µg/L	9.4	1000#1	7000#7	133	152	52.7	99.2	138	130	27.8	82.3	140	107	137	65.1	106	52.2	
	Cadmium (Filtered)	µg/L	0.1	5#1	0.2#4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.32#9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
	Chromium (III+VI) (Filtered)	µg/L	0.22	50#1	0.6#4	2.23	3.62	1.83	2.26	5.24	3.95	7.52	7.21	7.71	3.95	3.44	3.15	2.27	1.22	
	Cobalt (Filtered)	µg/L	0.06	6#5	3#7	0.3	2.33	0.594	3.15	3.29	2.77	9.27	0.337	1.25	9.39	4.35	1.79	11.8	0.262	
	Copper (Filtered)	µg/L	0.85	2000#1	5#4	1.95	1.13	0.939	1.09	1.59	1.4	61.3	1.16	1.74	1.26	1.29	<0.85	1.08	1.13	
	Lead (Filtered)	µg/L	0.02	25#1	7.2#4	0.059	0.034	0.066	0.057	0.072	0.033	22.6	<0.02	0.057	0.085	0.04	<0.02	0.098	0.028	
	Manganese (Filtered)	µg/L	0.04	50#1		772	91.2	8.89	860	1200	169	983	23	665	1320	126	2270	1180	7.19	
	Mercury (Filtered)	µg/L	0.01	1#1	0.05#4	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0171	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
	Nickel (Filtered)	µg/L	0.15	20#1	20#4	6.63	6.92	1.77	5.5	8.43	7.03	12.3	2.26	8.43	11	6.1	3.85	18.4	1.81	
	Selenium (Filtered)	µg/L	0.39	10#1		9.71	9.06	0.781	1.67	1.13	1.92	1.87	1.86	7.19	3	13.2	2.87	1.76	0.897	
	Silver	µg/L	1.5	94#5	0.5#7	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	
	Thallium (Filtered)	µg/L	0.96	0.2#5	<0.96	<0.96	<0.96	<0.96	<0.96	<0.96	<0.96	<0.96	<0.96	<0.96	<0.96	<0.96	<0.96	<0.96	<0.96	
	Vanadium (Filtered)	µg/L	0.24	86#5	100#7	0.657	1.56	1.61	1.33	2.35	1.56	7.67	0.759	0.67	1.57	1.33	1.07	0.941	1.45	
	Zinc (Filtered)	µg/L	0.41	6000#5	40#4	15.7	8.79	12.6	5.59	11.2	9.92	286	1.27	11.9	27.4	4.62	6	17.5	5.01	
	<b>Inorganics</b>	Nitrate (as NO3-)	mg/L	0.3	50#1		<0.3	5.18	21.5	6.42	0.926	4.42	<0.3	18.7	2.01	0.942	5.64	0.94	9.17	21.9
		ORTHOPHOSPHATE (PO4-P)	mg/L	0.05			<0.05	0.465	7.3	1.55	0.07	0.302	14.1	4.46	<0.05	0.297	0.216	<0.05	0.056	7.28
Ammoniacal Nitrogen as N		mg/L	0.2	0.389#1		0.268	<0.2	<0.2	0.508	0.707	0.619	5.66	<0.2	<0.2	1.23	<0.2	4.74	<0.2	<0.2	
Ammonium as NH4 BRE		mg/L	0.3			0.345	<0.3	<0.3	0.653	0.909	0.796	7.28	<0.3	<0.3	1.58	<0.3	6.09	<0.3	<0.3	
Sulphate (soluble)		mg/l	2			457	57.4	43	79.9	74.5	61.6	<2	70.1	287	75	55.2	37.5	82.2	42.3	
COD		mg/L	7			<7	<7	8.09	21.2	10.1	10.5	3330	<7	7.65	190	<7	43.5	<7	<7	
pH (Lab)		pH Units	1				7.59	7.45	7.1	7.39	7.9	7.38	7.55	7.56	7.22	7.49	7.52	7.32	8.09	7.14

Notes:

- GAC Generic Assessment Criteria
- DWS UK Drinking Water Standards
- EQS Coastal Environmental Water Quality Standard - Coastal Waters
- EQL Estimated Quantitation Limit
- Laboratory Method Detection Limit is greater than GAC
- GAC Exceedance

- #1 WS Regs 2010 (Eng/Wal)
- #2 WHO Petroleum In DW 2008
- #3 WHO DWG 2011
- #4 WFD EQS 2010 Coastal (Eng/Wal)
- #5 USEPA RSL (tapwater)
- #6 SEPA WAT-SG-53 Marine EQS - MAC - 2013
- #7 SEPA WAT-SG-53 Marine EQS - AA - 2013
- #8 PNEC (EU REACH) - Coastal
- #9 New Hampshire DES (2009)
- #10 California Draft health protective concentration
- #11 Caic WHO



Table 8 - TPH, BTEX, MTBE and TAME Concentrations in Groundwater

Analyte	Units	EQL	DWS GAC	Well ID	BH2	BH3	BH4	BH5	BH7	BH8	BH9	BH10	BH104B	BH109	BH110	BH111	BH201A	DUP01 (BH4)
				Date Sampled	02/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015	01/09/2015	02/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015
TPH	GRO >C5-C10	µg/L	10		<10	<10	<10	<10	<10	<10	281	<10	<10	<10	<10	<10	<10	<10
	EPH >C6-C10	µg/L	100		<100	<100	<100	<100	<100	<100	<100	-	<100	<100	<100	<100	<100	<100
	EPH >C6-C40	µg/L	100		<100	<100	<100	<100	<100	<100	1430	<100	<100	159	<100	<100	<100	<100
	EPH >C10-C40	µg/L	46		<46	<46	<46	<46	<46	<46	1430	<46	<46	159	<46	65.8	<46	<46
	>C12-C16 Aliphatics	µg/L	10	300 <sup>#2</sup>	-	<10	<10	<10	-	<10	-	-	-	<10	<10	<10	-	<10
	>C16-C21 Aliphatics	µg/L	10	300 <sup>#2</sup>	-	<10	<10	<10	-	<10	-	-	-	<10	<10	<10	-	<10
	>C16-C35 Aliphatics	µg/L	-		-	<20	<20	<20	-	<20	-	-	-	<20	<20	<20	-	<20
	>C21-C35 Aliphatics	µg/L	10	300 <sup>#2</sup>	-	<10	<10	<10	-	<10	-	-	-	<10	<10	<10	-	<10
	>C12-C35 Aliphatics	µg/L	10		-	<10	<10	<10	-	<10	-	-	-	<10	<10	<10	-	<10
	>EC12-EC16 Aromatics	µg/L	10	90 <sup>#2</sup>	-	<10	<10	<10	-	<10	-	-	-	<10	<10	<10	-	<10
	>EC16-EC21 Aromatics	µg/L	10	90 <sup>#2</sup>	-	<10	<10	<10	-	<10	-	-	-	<10	<10	<10	-	<10
	>EC21-EC35 Aromatics	µg/L	10	90 <sup>#2</sup>	-	<10	<10	<10	-	<10	-	-	-	<10	<10	<10	-	<10
	>EC12-EC35 Aromatics	µg/L	10		-	<10	<10	<10	-	<10	-	-	-	<10	<10	<10	-	<10
>C5-C35 Aliphatics & Aromatics	µg/L	10		-	<10	<10	<10	-	<10	-	-	-	<10	<10	<10	-	<10	
BTEX	Benzene	µg/L	1	1 <sup>#1</sup>	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Toluene	µg/L	1	700 <sup>#3</sup>	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Ethylbenzene	µg/L	1	300 <sup>#3</sup>	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Xylene (m & p)	µg/L	1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Xylene Total	µg/L	-	500 <sup>#3</sup>	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Xylene (o)	µg/L	1	9.99000000000000018E11 <sup>#1</sup>	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total BTEX	µg/L	28		<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	
Oxygenates	MTBE	µg/L	1	900 <sup>#11</sup>	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Tert Amyl Methyl Ether	µg/L	1	140 <sup>#9</sup>	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Notes:  
 GAC Generic Assessment Criteria  
 DWS UK Drinking Water Standards  
 EQL Estimated Quantitation Limit

- #1 WS Regs 2010 (Eng/Wal)
- #2 WHO Petroleum In DW 2008
- #3 WHO DWG 2011
- #4 WFD EQS 2010 Coastal (Eng/Wal)
- #5 USEPA RSL (tapwater)
- #6 SEPA WAT-SG-53 Marine EQS - MAC - 2013
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- #8 PNEC (EU REACH) - Coastal
- #9 New Hampshire DES (2009)
- #10 California Draft health protective concentration
- #11 Calc WHO

Table 9 - PAH Concentrations in Groundwater

Analyte	Units	EQL	DWS GAC	Well ID	BH2	BH3	BH4	BH5	BH7	BH8	BH9	BH10	BH104B	BH109	BH110	BH111	BH201A	DUP01 (BH4)
				Date Sampled	02/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015	01/09/2015	02/09/2015	01/09/2015	01/09/2015	02/09/2015
Naphthalene	µg/L	1	6#11	EQS Coastal GAC	1.2#4	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Acenaphthylene	µg/L	1	18#11			<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Acenaphthene	µg/L	1	18#11			<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Fluorene	µg/L	1	12#11			<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Phenanthrene	µg/L	1	4#11			<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Anthracene	µg/L	1	90#11	0.1#4	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Fluoranthene	µg/L	1	4#11	0.1#4	<1	<1	<1	<1	<1	<1	6.12	<1	<1	<2	<1	<1	<1	-
Pyrene	µg/L	1	9#11			<1	<1	<1	<1	<1	4.78	<1	<1	<2	<1	<1	<1	-
Benzo(a)anthracene	µg/L	1	0.1#11			<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Chrysene	µg/L	1	1#11			<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Benzo(a) pyrene	µg/L	1	0.01#1	0.05#4	<1	<1	<1	<1	<1	<1	4.69	<1	<1	<2	<1	<1	<1	-
Indeno(1,2,3-c,d)pyrene	µg/L	1	9.99000000000029E11#1			<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Dibenz(a,h)anthracene	µg/L	1	0.01#11			<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Benzo(g,h,i)perylene	µg/L	1	9.99000000000029E11#1			<1	<1	<1	<1	<1	4.05	<1	<1	<2	<1	<1	<1	-
Benzo(b)fluoranthene	µg/L	1	9.99000000000029E11#1			<1	<1	<1	<1	<1	6.42	<1	<1	<2	<1	<1	<1	-
Benzo(k)fluoranthene	µg/L	1	9.99000000000029E11#1			<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Benzo(b)&(k)fluoranthene	µg/L	-		0.03#4	<2	<2	<2	<2	<2	<2	9.42	<2	<2	<4	<2	<2	<2	-
PAHs (sum of 4)	µg/L	-	0.1#1		<4	<4	<4	<4	<4	<4	14.47	<4	<4	<8	<4	<4	<4	-
benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	µg/L	-		0.002#4	<2	<2	<2	<2	<2	<2	6.05	<2	<2	<4	<2	<2	<2	-
Coal Tar (Bap as surrogate marker)	µg/L	-			<1	<1	<1	<1	<1	<1	4.69	<1	<1	<2	<1	<1	<1	-

Notes:  
 Generic Assessment Criteria GAC  
 UK Drinking Water Standards DWS  
 Environmental Water Quality Standard - Coastal Waters EQS Coastal  
 Estimated Quantitation Limit EQL  
 Laboratory Method Detection Limit is greater than GAC  
 GAC Exceedance

- #1 WS Regs 2010 (Eng/Wal)
- #2 WHO Petroleum In DW 2008
- #3 WHO DWG 2011
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- #9 New Hampshire DES (2009)
- #10 California Draft health protective concentration
- #11 Calc WHO



Table 10 - VOCs and SVOCs Concentrations in Groundwater

Analyte	Units	EQL	DWS GAC	Well ID	BH2	BH3	BH4	BH5	BH7	BH8	BH9	BH10	BH104B	BH109	BH110	BH111	BH201A	DUP01 (BH4)
				Date Sampled	02/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015	01/09/2015	02/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015
				EQS Coastal GAC														
Phenolics	2-methylphenol	µg/L	1	930#5	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	2-nitrophenol	µg/L	1		<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	2,4-dimethylphenol	µg/L	1	360#5	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	4-chloro-3-methylphenol	µg/L	1	1400#5	40#4	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	4-methylphenol	µg/L	1	1900#5		<1	<1	<1	<1	<1	172	<1	<1	<2	<1	5.42	<1	-
	4-nitrophenol	µg/L	1			<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Phenol	µg/L	1	5800#5	7.7#4	<1	<1	<1	<1	<1	<1	10.7	<1	<1	<2	<1	<1	<1	-
	2-chloronaphthalene	µg/L	1	750#5	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Amino Aliphatics	N-nitrosodi-n-propylamine	µg/L	1	0.011#5	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Anilines	2-nitroaniline	µg/L	1	190#5	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	3-nitroaniline	µg/L	1		<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	4-chloroaniline	µg/L	1	0.36#5	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	4-nitroaniline	µg/L	1	3.8#5	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Explosives	2,4-Dinitrotoluene	µg/L	1	0.24#5	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	2,6-dinitrotoluene	µg/L	1	0.048#5	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	Nitrobenzene	µg/L	1	0.14#5	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Halogenated Benzenes	1,3,5-Trichlorobenzene	µg/L	1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Chlorobenzene	µg/L	1	300#3	1.7	<1	<1	<1	1.77	<1	1.89	<1	<1	<1	<1	<1	1.8	<1
	Bromobenzene	µg/L	1	62#5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	2-chlorotoluene	µg/L	1	240#5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	4-chlorotoluene	µg/L	1	250#5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	1,3-dichlorobenzene	µg/L	1		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	1,4-dichlorobenzene	µg/L	1	300#3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	1,2-dichlorobenzene	µg/L	1	1000#3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	1,2,4-trichlorobenzene	µg/L	1	1.1#5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	1,2,3-trichlorobenzene	µg/L	1	7#5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Hexachlorobenzene	µg/L	1	1#3	0.01#4	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1
Halogenated Hydrocarbons	Dichlorodifluoromethane	µg/L	1	200#5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Bromomethane	µg/L	1	7.5#5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Trichlorofluoromethane	µg/L	1	1100#5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	1,2-dibromoethane	µg/L	1	0.1#1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Halogenated Phenols	2-chlorophenol	µg/L	1	0.1#3	50#4	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	2,4-dichlorophenol	µg/L	1	0.3#3	20#4	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	2,4,5-trichlorophenol	µg/L	1	9#3		<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	2,4,6-trichlorophenol	µg/L	1	200#3		<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	Pentachlorophenol	µg/L	1	9#3	0.4#4	<1	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	-

Table 10 - VOCs and SVOCs Concentrations in Groundwater

Analyte	Units	EQL	DWS GAC	Well ID	BH2	BH3	BH4	BH5	BH7	BH8	BH9	BH10	BH104B	BH109	BH110	BH111	BH201A	DUP01 (BH4)
				Date Sampled	02/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015	01/09/2015	02/09/2015	01/09/2015	01/09/2015	01/09/2015	02/09/2015
Phthalates	Bis(2-ethylhexyl) phthalate	µg/L	2	8#3	1.3#4	<2	<2	<2	<2	<2	<2	<2	<2	<4	<2	<2	<2	-
	Butyl benzyl phthalate	µg/L	1	16#5	20#7	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	Di-n-butyl phthalate	µg/L	1	900#5	8#7	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	Di-n-octyl phthalate	µg/L	5	200#5	20#7	<5	<5	<5	<5	<5	<20	<5	<5	<10	<5	<5	<5	-
	Diethylphthalate	µg/L	1	15000#5	200#7	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
	Dimethyl phthalate	µg/L	1		800#7	<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-
Solvents	Carbon disulfide	µg/L	1	810#5		<1	<1	<1	<1	<1	2.28	<1	<1	<1	<1	<1	<1	<1
	Isophorone	µg/L	1	78#5		<1	<1	<1	<1	<1	<4	<1	<1	<2	<1	<1	<1	-

Notes:  
 GAC Generic Assessment Criteria  
 DWS UK Drinking Water Standards  
 EQS Coastal Environmental Water Quality Standard - Coastal Waters  
 EQL Estimated Quantitation Limit  
 Laboratory Method Detection Limit is greater than GAC  
 GAC Exceedance

- #1 WS Regs 2010 (Eng/Wal)
- #2 WHO Petroleum In DW 2008
- #3 WHO DWG 2011
- #4 WFD EQS 2010 Coastal (Eng/Wal)
- #5 USEPA RSL (tapwater)
- #6 SEPA WAT-SG-53 Marine EQS - MAC - 2013
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- #8 PNEC (EU REACH) - Coastal
- #9 New Hampshire DES (2009)
- #10 California Draft health protective concentration
- #11 Calc WHO

Table 11 - Field Duplicate QA Check

Well ID	BH4	DUP01	RPD
Date Sampled	01/09/2015	01/09/2015	

Method Type	Analyte	Units	EQL			
EPH by GC-FID	>C10-C40	µg/l		<46	<46	0
GRO by Headspace GC-FID	>C5-C10	µg/l		<10	<10	0
	MTBE	µg/l		<1	<1	0
	Benzene	µg/l		<1	<1	0
	Toluene	µg/l		<1	<1	0
	Ethylbenzene	µg/l		<1	<1	0
	Xylene (m & p)	µg/l		<1	<1	0
	Xylene (o)	µg/l		<1	<1	0
Metals by ICP-OES	Arsenic (Filtered)	µg/l		52.7	52.2	0
	Boron (Filtered)	µg/l		<0.1	<0.1	0
	Cadmium (Filtered)	µg/l		1.53	1.22	11
	Chromium (III+VI) (Filtered)	µg/l		0.939	1.13	9
	Copper (Filtered)	µg/l		0.066	0.028	40
	Lead (Filtered)	µg/l		<0.01	<0.01	0
	Mercury (Filtered)	µg/l		1.77	1.81	1
	Nickel (Filtered)	µg/l		0.781	0.897	7
	Selenium (Filtered)	µg/l		12.6	5.01	43
	Zinc (Filtered)	µg/l		21.5	21.9	1
pH by Metrohm	pH (Lab)	-		7.1	7.14	0
SO4, Cl, NO3, NO2, PO4, Amm N2, Thiocyanate, He...	Nitrate (as NO3-)	mg/l		7.3	7.28	0
	ORTHOPHOSPHATE (PO4-P)	mg/l		<0.2	<0.2	0
	Ammoniacal Nitrogen as N	mg/l		<0.3	<0.3	0
	Ammonium as NH4 BRE	mg/l		43	42.3	1
	Sulphate (soluble)	µg/l		28.2	28.4	0

\*RPDs have only been considered where a concentration is greater than 1 times the EQL.

\*\*High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 100 (1-10 x EQL); 50 (10-20 x EQL); 30 (> 20 x EQL) )

\*\*\*Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

## GRAPHS

# GRAPH 1

## Diver data for borehole BH201A - Stag Brewery

