Wesson Environmental

Solutions to your contaminated land issues
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03 January 2018

Soil Sampling, 195, Fordwych Road, London

Wesson Environmental carried out a phase 1 desktop study concerning the site located on Fordwych Road in June 2017. Due to the location of the site adjacent to a railway embankment, risks form contaminants in site soils from heavy metals, polycyclic aromatic hydrocarbon (PAH) compounds and petroleum hydrocarbon (TPH) compounds could not be ruled out. Consequently, it was recommended that a limited intrusive investigation was carried out to determine the risks to future site users. Controlled waters were not considered to be at risk because of the underlying geology of the site. As an alternative, it was proposed that where landscaping was proposed that soils may be excavated to a minimum of 600mm below ground level with a minimum of 600mm of certified clean materials emplaced if the local authority were in agreement with this. A strategy for validation was also required. However, it is understood that these recommendations were not followed, with approximately 200mm of imported soils emplaced in the soft landscaped areas.

Consequently, it was proposed that soils were sampled from both the shallower imported layer and from the deeper 'original' soil layer to determine whether contaminants were present at concentrations above generic assessment criteria (GAC).

Hand Auger Sampling

A total number of 6 locations were advanced to a maximum depth of 0.5m below ground level (BGL) using a hand auger.

The sequence of strata encountered was as follows:

- **Topsoil or Made ground** – This was present as a brown or grey clay with various anthropogenic materials present including masonry fragments, coal fragments, and occasional ash.
- **Clay** – This was only encountered in location HA3 as a distinct layer from the made ground/topsoil and consisted of a firm grey, orange streaked clay which had rare ash present.

In location HA4 only crushed masonry and sand was encountered with a refusal at 0.3m bgl.

Samples were retained in plastic tubs, amber jars and volatile vials as appropriate for the determinands in questions. Following collection of samples, containers were retained in a cool box with ice packs until collection. Samples were analysed for the following determinands:

- Heavy metals
- Polycyclic aromatic hydrocarbons (PAH) - speciated
- Total petroleum hydrocarbons speciated by chain length and aromatic/aliphatic characteristics
- Asbestos
- Phenols
- Soil organic matter (SOM)
- pH

Analysis was carried out at an MCERTS/UKAS accredited facility.

Site observations

Observations of potential contamination were restricted to anthropogenic inclusions in the soils of masonry fragments, cola fragments and ash. There was no evidence of staining or olfactory evidence of hydrocarbons present in the soils encountered.

Visual inspection of the soils did not indicate any significant visual difference between the shallow soils and the deeper soils with the exception of HA3

Chemical analysis results

Boron, mercury and selenium were below limits of detection (LOD) in all samples.

PAH compounds were all generally present above limits of detection in site soils.

Aliphatic TPH compounds with a chain length of less than C16 were generally not present above LOD except in the samples from HA1 at 0-0.2m bgl and HA4 where they were present marginally above GAC. Those compounds with a chain length of C21-C35 were present at low level in all samples. In the case of aromatic compounds, those with a chain length below C12 were generally not present above GAC except in the sample from HA1 at 0-0.2m bgl, HA4 and both samples from HA6 at low levels. Higher concentrations of aromatic compounds with a chain length of C16-C21 were and C21-C35 were present especially in the samples from HA1 at 0-0.2m bgl and HA4.

Phenols and BTEX/MTBE compounds were not present above limits of detection in any samples that were analysed for this determinand. Asbestos was not detected in any samples.

Risk Assessment

For the purposes of this report the site has been classed as follows:

Residential

The mean organic matter content in soils is 2.78% and therefore for those determinands that are dependent on organic matter content the 2.5% figure will be used.

The following GACs were used.

- For heavy metals except lead LQM/CIEH S4UL[1] values were used. Like the CLEA values these are based on HCVs to describe minimal risk.
- For lead, there is no published CLEA SGV and no LQM/CIEH S4UL value is available. Therefore, the C4SL value was used. This considered conservative especially compared to urban normal background concentrations.
- For barium and MTBE, the GAC from the CL:AIRE (2010) publication[2] was used.
- For phenols, PAH and TPH compounds, LQM/CIEH S4UL [1] values were used

Lead exceeded GAC in all samples except that from HA3 at 0.3-0.5m bgl and both samplers from HA6 (Table 1).

Determinand	Min	Max	GAC	Location
Arsenic	17	26	37	
Barium	100	260	1300	
Beryllium	0.8	1.5	1.7	
Boron (WS)	0	0	290	
Cadmium	0.2	0.7	11	
Chromium	20	37	910	
Copper	32	73	2400	
Lead	170	1100	210	HA1, HA2, HA4, HA5
Mercury	0	1.6	40	
Nickel	19	31	180	
Selenium	0	0	250	
Vanadium	40	67	410	
Zinc	150	550	3700	

Table 1. Heavy metals compared to GAC (mg/kg).

Benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, chrysene and dibenzo (ah) anthracene all exceeded GAC in a number of locations. (Table 2).

Determinand	Min	Max	GAC	Location
Acenaphthene	0	0.6	510	
Acenaphthylene	0	5	420	
Anthracene	0	14	5400	
Benzo(a)Anthracene	0.1	30	11	HA1 0-0.2m, HA4,
Benzo(a)Pyrene	0.1	28	2.7	HA1 0-0.2m, HA2 0-0.2m, HA4, HA6
Benzo(b)fluoranthene	0.2	23	3.3	HA1 0-0.2m, HA2 0-0.2m, HA4, HA6
Benzo(ghi)Perylene	0	12	340	
Benzo(k)fluoranthene	0.1	22	93	
Chrysene	0.2	28	22	HA4
Dibenzo(ah)Anthracene	0	3.7	0.28	HA1 0-0.2m, HA2 0-0.2m, HA3 0-0.2m, HA4, HA6
Fluoranthene	0.3	75	560	
Fluorene	0	4.2	400	
Indeno(123-cd) Pyrene	0	12	36	
Naphthalene	0	2.6	5.6	
Phenanthrene	0.1	50	220	
Pyrene	0.2	62	1200	

Table 2. PAH compounds compared to GAC (mg/kg).

Whilst some TPH compounds were elevated above LOD, especially in the samples from HA1 and HA4, no TPH compounds were present above GAC.

Determinand	Min	Max	GAC
TPH (C5-C6 aliphatic)	0	0	78
TPH (C6-C8 aliphatic)	0	0	230
TPH (C8-C10 aliphatic)	0	0	65
TPH (C10-C12 aliphatic)	0	0	330
TPH (C12-C16 aliphatic)	0	0	2400
TPH (C16-C21 aliphatic)	0	3	92000
TPH (C21-C35 aliphatic)	2	13	92000
	0	0	
TPH (C6-C7 aromatic)	0	0	140
TPH (C7-C8 aromatic)	0	0	290
TPH (C8-C10 aromatic)	0	0	83
TPH (C10-C12 aromatic)	0	0	180
TPH (C12-C16 aromatic)	0	19	330
TPH (C16-C21 aromatic)	0	250	540
TPH (C21-C35 aromatic)	5	360	1500

Table 3. **TPH compounds compared to GAC (mg/kg).**

Exceedances of GAC and Data Distribution

Lead exceeds GAC in the shallowest samples from HA1, HA2, HA3, HA4 and HA5. Exceedances of GAC by lead were also recorded in deeper samples in HA1, HA2 and HA5. The exceedances of GAC were generally substantial with greater exceedance in the shallowest samples. Exceedances of GAC compounds were encountered in shallow soils in HA1, HA2, HA3, HA4 and HA6. Exceedances by PAH compounds were encountered in deeper soils in HA2 and HA5. Again, where exceedances occurred, these were generally substantial with the greatest exceedance encountered in the sample from HA4 followed by HA1. The data distribution is such that every location demonstrates an exceedance of GAC by one class of contaminant with the exception of the deeper sample from HA3.

Risk Assessment

The exceedance of a particular guideline value does not however, in itself enable an evaluation to be made of whether or not the subsequent risk posed to receptors is acceptable. The risks from a particular pollutant linkage should therefore be evaluated to enable a determination of whether or not the risks are acceptable. This requires classification of:

The magnitude of the severity of the risk occurring (Table 4)
The magnitude of the likelihood of the risk occurring (Table 5)

Classification	Definition
Severe	Short term risk to human health which is likely to result in 'significant harm' as defined by the Environmental Protection Act 1990, Part IIA. Short term risk of pollution of sensitive water resources. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism forming part of such an organism
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in a particular ecosystem, or organism forming part of such ecosystem.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings/structures/services or the environment
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent effects to human health which may easily be prevented by measures such as personal protective clothing, etc. Easily repairable effects of damage to buildings, structures and services

Table 4: Classification of severity of risk after CIRIA 552

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

Table 5: Classification of likelihood of risk after CIRIA 552

To evaluate the risk that each pollutant linkage present on the site poses to a specified receptor, the classifications from each table are compared. It is important that this is only applied where the possibility of an existing pollutant linkage exists. This enables a risk category to be produced that range from 'very high risk' to 'very low risk' (Table 6.)

		Consequence			
		Severe	Medium	Mild	Minor
Likelihood	High Likelihood	Very High Risk	High Risk	Moderate risk	Moderate/low risk
	Likely	High Risk	Moderate Risk	Moderate/ low risk	Low risk
	Low likelihood	Moderate risk	Moderate/ low risk	Low risk	Very low risk
	Unlikely	Moderate/ low risk	Low risk	Very low risk	Very low risk

Table 6: Comparison of consequence with likelihood of risk occurring, after CIRIA 552

The exceedance of GAC by lead and some PAH compounds indicates that a potential risk is present to future site users. Table 7 (below) refines the conceptual site model and evaluates that risk using the method discussed above for different pathways:

Source	Pathway	Receptor	Severity	Likelihood	Consequence/ likelihood
Heavy Metals	Ingestion of soils including attached to vegetables	Site Users	Medium	Likely	Moderate Risk
	Consumption of home grown produce		Medium	Likely	Moderate Risk
	Dermal contact		Medium	Likely	Moderate Risk
	Dust inhalation - indoor		Medium	Likely	Moderate Risk
	Dust Inhalation - outdoor		Medium	Likely	Moderate Risk
PAH	Ingestion of soils including attached to vegetables	Site Users	Medium	Likely	Moderate Risk
	Consumption of home grown produce		Medium	Likely	Moderate Risk
	Dermal contact		Medium	Likely	Moderate Risk
	Dust inhalation - indoor		Medium	Likely	Moderate Risk
	Dust Inhalation - outdoor		Medium	Likely	Moderate Risk

Table 7. Tabular human health conceptual site model

Given the distribution of contamination in the site soils and the scale of the exceedance in some locations, we do not consider that risks from contaminated soils to future site users have been mitigated. The refined conceptual site model indicates that the risk from heavy metals and PAH compounds to site users is moderate. Therefore, remediation of soils used in areas of soft landscaping will need to be carried out and independently validated. A remedial methodology should be produced and agreed with the LPA and should include details of the remedial measures to be carried out and

Conclusions and recommendations

Soils on the site are considered to pose a MODERATE risk to human health and the wider environment. Therefore, remediation of site soils must be carried out prior to occupation. The methodology should be set out in a remediation method statement and this should be agreed with the LPA prior to works commencing.

Should during any works on the site, evidence of contamination become apparent, this should be reported to the Local Authority contaminated land officer.

Dr. Richard Wesson
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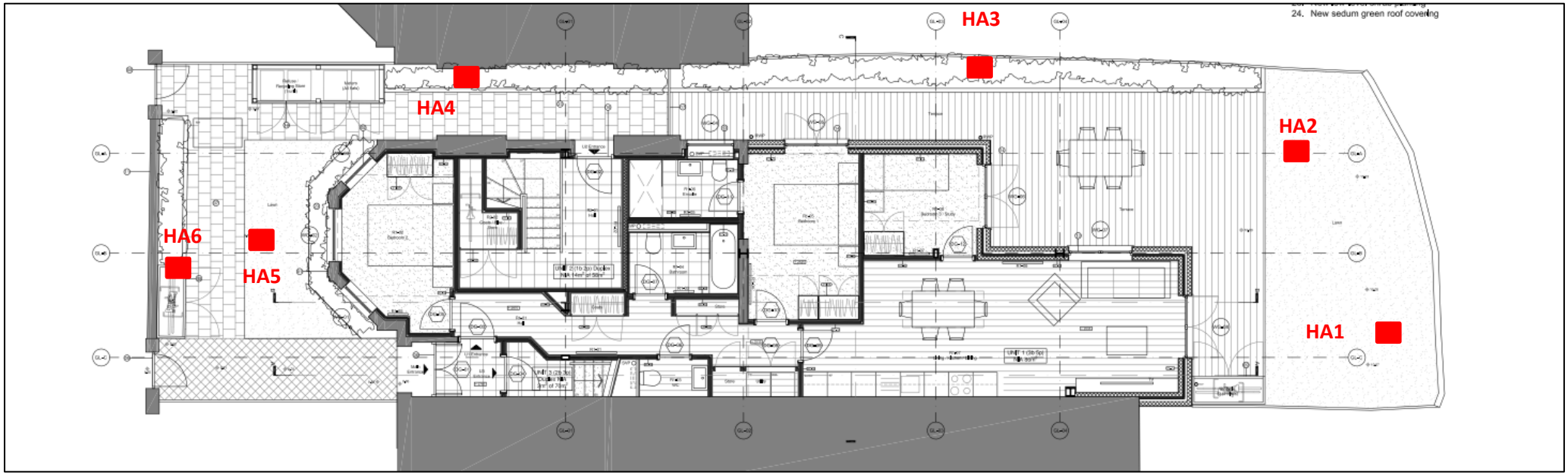
Wesson Environmental

Appendix A

Figures

Figure 1. Sample locations



Appendix B

Analytical Data

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

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Concept Life Sciences

Certificate of Analysis

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Report Number: 702313-1

Date of Report: 19-Dec-2017

Customer: Wesson Environmental
St Brandon?s House
29 Great George Street
Bristol
BS1 5QT

Customer Contact: Mr Richard Wesson

Customer Job Reference:
Customer Site Reference: Fordwych Road
Date Job Received at Concept: 07-Dec-2017
Date Analysis Started: 12-Dec-2017
Date Analysis Completed: 15-Dec-2017

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

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

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Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

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mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked
and authorised by :
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Customer Service Advisor

Issued by :
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Customer Service Advisor

Concept Reference: 702313
Project Site: Fordwych Road
Customer Reference:

Soil Analysed as Soil
CLEA metals, Braintree

				Concept Reference	**702313 001**	**702313 002**	**702313 003**	**702313 004**	**702313 005**	**702313 006**
				Customer Sample Reference	**HA1 @ 0-0.2**	**HA1 @ 0.3-0.5m**	**HA2 @ 0-0.2m**	**HA2 @ 0.3-0.4m**	**HA3 @ 0-0.2m**	**HA3 @ 0.3-0.5m**
				Date Sampled	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**
				Matrix Class	**Clay**	**Clay**	**Clay**	**Clay**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Arsenic	T257	A40	2	mg/kg	**25**	**21**	**22**	**17**	**17**	**18**
Barium	T257	A40	2	mg/kg	**260**	**110**	**200**	**180**	**120**	**100**
Beryllium	T245	A40	0.5	mg/kg	**1.4**	**1.2**	**1.2**	**0.9**	**1.0**	**1.1**
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	**0.7**	**0.3**	**0.5**	**0.4**	**0.5**	**0.2**
Chromium	T257	A40	0.5	mg/kg	**34**	**37**	**34**	**27**	**27**	**35**
Copper	T257	A40	2	mg/kg	**73**	**49**	**60**	**47**	**41**	**47**
Lead	T257	A40	2	mg/kg	**520**	**260**	**450**	**370**	**260**	**190**
Mercury	T245	A40	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0	**1.6**
Nickel	T257	A40	0.5	mg/kg	**26**	**23**	**24**	**19**	**21**	**23**
Selenium	T257	A40	3	mg/kg	<3	<3	<3	<3	<3	<3
Vanadium	T257	A40	0.1	mg/kg	**66**	**67**	**62**	**49**	**48**	**64**
Zinc	T257	A40	2	mg/kg	**540**	**280**	**430**	**330**	**190**	**550**
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected
pH	T7	A40			**7.9**	**8.2**	**8.2**	**8.2**	**8.0**	**7.7**
Organic Matter	T258	A40	0.5	%	**3.0**	**2.5**	**2.9**	**2.4**	**3.0**	**3.1**
Phenols(Mono)	T921	AR	1	mg/kg	<1	<1	<1	<1	<1	<1
Moisture @105C	T162	AR	0.1	%	**24**	**25**	**24**	**21**	**29**	**28**
Retained on 2mm	T2	A40	0.1	%	**27.3**	**43.5**	**15.1**	**20.4**	**17.8**	**3.8**

Concept Reference: 702313
Project Site: Fordwych Road
Customer Reference:

Soil Analysed as Soil
CLEA metals, Braintree

				Concept Reference	**702313 007**	**702313 008**	**702313 009**	**702313 010**	**702313 011**
				Customer Sample Reference	**HA4 @ 0-0.3m**	**HA5 @ 0-0.2m**	**HA5 @ 0.3-0.5m**	**HA6 @ 0-0.2m**	**HA6 @ 0.3-0.5m**
				Date Sampled	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**
				Matrix Class	**Fill**	**Clay**	**Clay**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T257	A40	2	mg/kg	**19**	**26**	**18**	**21**	**19**
Barium	T257	A40	2	mg/kg	**230**	**260**	**100**	**110**	**110**
Beryllium	T245	A40	0.5	mg/kg	**0.9**	**1.5**	**0.8**	**1.0**	**1.2**
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	**0.5**	**0.5**	**0.2**	**0.3**	**0.2**
Chromium	T257	A40	0.5	mg/kg	**20**	**33**	**26**	**27**	**37**
Copper	T257	A40	2	mg/kg	**65**	**67**	**32**	**42**	**48**
Lead	T257	A40	2	mg/kg	**410**	**1100**	**380**	**210**	**170**
Mercury	T245	A40	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	**19**	**25**	**21**	**19**	**31**
Selenium	T257	A40	3	mg/kg	<3	<3	<3	<3	<3
Vanadium	T257	A40	0.1	mg/kg	**40**	**66**	**57**	**53**	**67**
Zinc	T257	A40	2	mg/kg	**350**	**400**	**150**	**150**	**160**
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected
pH	T7	A40			**9.2**	**7.8**	**7.9**	**7.9**	**7.3**
Organic Matter	T258	A40	0.5	%	**2.4**	**4.3**	**1.6**	**3.5**	**1.9**
Phenols(Mono)	T921	AR	1	mg/kg	<1	<1	<1	<1	<1
Moisture @105C	T162	AR	0.1	%	**26**	**29**	**21**	**25**	**22**
Retained on 2mm	T2	A40	0.1	%	**21.8**	**12.5**	**31.5**	**4.9**	**4.7**

Concept Reference: 702313
Project Site: Fordwych Road
Customer Reference:

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE) (MCERTS)

				Concept Reference	**702313 001**	**702313 002**	**702313 003**	**702313 004**	**702313 005**	**702313 006**
				Customer Sample Reference	**HA1 @ 0-0.2**	**HA1 @ 0.3-0.5m**	**HA2 @ 0-0.2m**	**HA2 @ 0.3-0.4m**	**HA3 @ 0-0.2m**	**HA3 @ 0.3-0.5m**
				Date Sampled	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**
				Matrix Class	**Clay**	**Clay**	**Clay**	**Clay**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Naphthalene	T16	AR	0.1	mg/kg	**1.6**	<0.1	**0.8**	**1.0**	**0.1**	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	**1.8**	<0.1	**1.5**	**0.1**	**0.1**	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	**0.3**	<0.1	**0.2**	<0.1	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	**1.7**	<0.1	**1.0**	<0.1	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	**22**	**1.1**	**13**	**2.4**	**1.7**	**0.1**
Anthracene	T16	AR	0.1	mg/kg	**6.4**	**0.2**	**3.5**	**0.4**	**0.4**	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	**41**	**2.1**	**25**	**3.8**	**4.0**	**0.3**
Pyrene	T16	AR	0.1	mg/kg	**34**	**1.7**	**21**	**3.0**	**3.4**	**0.2**
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	**17**	**0.8**	**9.8**	**1.5**	**1.9**	**0.1**
Chrysene	T16	AR	0.1	mg/kg	**17**	**0.8**	**10**	**1.5**	**1.9**	**0.2**
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	**14**	**0.9**	**8.4**	**1.7**	**2.2**	**0.2**
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	**13**	**0.6**	**7.2**	**1.0**	**1.3**	**0.1**
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	**16**	**0.8**	**9.5**	**1.4**	**1.9**	**0.1**
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	**6.8**	**0.4**	**4.0**	**0.7**	**1.0**	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	**3.0**	**0.2**	**1.8**	**0.3**	**0.4**	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	**7.2**	**0.4**	**4.0**	**0.7**	**1.0**	<0.1
PAH(total)	T16	AR	0.1	mg/kg	**200**	**10**	**120**	**20**	**21**	**1.3**

Concept Reference: 702313
Project Site: Fordwych Road
Customer Reference:

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE) (MCERTS)

				Concept Reference	**702313 007**	**702313 008**	**702313 009**	**702313 010**	**702313 011**
				Customer Sample Reference	**HA4 @ 0-0.3m**	**HA5 @ 0-0.2m**	**HA5 @ 0.3-0.5m**	**HA6 @ 0-0.2m**	**HA6 @ 0.3-0.5m**
				Date Sampled	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**
				Matrix Class	**Fill**	**Clay**	**Clay**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T16	AR	0.1	mg/kg	**2.6**	<0.1	<0.1	**0.6**	**0.2**
Acenaphthylene	T16	AR	0.1	mg/kg	**5.0**	<0.1	<0.1	**0.7**	**0.3**
Acenaphthene	T16	AR	0.1	mg/kg	**0.6**	<0.1	<0.1	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	**4.2**	<0.1	<0.1	**0.3**	**0.1**
Phenanthrene	T16	AR	0.1	mg/kg	**50**	**0.4**	**0.2**	**9.8**	**3.2**
Anthracene	T16	AR	0.1	mg/kg	**14**	<0.1	<0.1	**2.0**	**0.6**
Fluoranthene	T16	AR	0.1	mg/kg	**75**	**0.9**	**0.9**	**23**	**11**
Pyrene	T16	AR	0.1	mg/kg	**62**	**0.8**	**0.8**	**18**	**9.0**
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	**30**	**0.4**	**0.4**	**9.1**	**5.2**
Chrysene	T16	AR	0.1	mg/kg	**28**	**0.5**	**0.5**	**8.8**	**5.4**
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	**23**	**0.6**	**0.4**	**6.4**	**6.2**
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	**22**	**0.3**	**0.3**	**6.1**	**4.2**
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	**28**	**0.4**	**0.5**	**9.1**	**5.6**
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	**12**	**0.2**	**0.3**	**3.7**	**2.3**
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	**3.7**	**0.1**	**0.1**	**1.6**	**1.0**
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	**12**	**0.2**	**0.3**	**3.9**	**2.5**
PAH(total)	T16	AR	0.1	mg/kg	**370**	**4.9**	**4.8**	**100**	**56**

Concept Reference: 702313
Project Site: Fordwych Road
Customer Reference:

Soil Analysed as Soil
TPH (CWG) with MTBE & BTEX SE

				Concept Reference	**702313 001**	**702313 002**	**702313 003**	**702313 004**	**702313 005**	**702313 006**
				Customer Sample Reference	**HA1 @ 0-0.2**	**HA1 @ 0.3-0.5m**	**HA2 @ 0-0.2m**	**HA2 @ 0.3-0.4m**	**HA3 @ 0-0.2m**	**HA3 @ 0.3-0.5m**
				Date Sampled	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**
				Matrix Class	**Clay**	**Clay**	**Clay**	**Clay**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Benzene	T209	AR	10	µg/kg	<10	<10	<10	<10	<10	<10
Toluene	T209	AR	10	µg/kg	<10	<10	<10	<10	<10	<10
EthylBenzene	T209	AR	10	µg/kg	<10	<10	<10	<10	<10	<10
M/P Xylene	T209	AR	10	µg/kg	<10	<10	<10	<10	<10	<10
O Xylene	T209	AR	10	µg/kg	<10	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	AR	10	µg/kg	<10	<10	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C6-C7 aromatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C6-C8 aliphatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aromatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2	<2	<2
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2	<2	<2
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2	<2	<2
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	**10**	<2	**6**	<2	<2	<2
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	**3**	<2	<2	<2	<2	<2
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	**140**	**7**	**81**	**8**	**16**	<2
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	**11**	**8**	**9**	**4**	**5**	**4**
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	**230**	**19**	**150**	**23**	**42**	**5**

Concept Reference: 702313
Project Site: Fordwych Road
Customer Reference:

Soil Analysed as Soil
TPH (CWG) with MTBE & BTEX SE

				Concept Reference	**702313 007**	**702313 008**	**702313 009**	**702313 010**	**702313 011**
				Customer Sample Reference	**HA4 @ 0-0.3m**	**HA5 @ 0-0.2m**	**HA5 @ 0.3-0.5m**	**HA6 @ 0-0.2m**	**HA6 @ 0.3-0.5m**
				Date Sampled	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**	**05-DEC-2017**
				Matrix Class	**Fill**	**Clay**	**Clay**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Benzene	T209	AR	10	µg/kg	<10	<10	<10	<10	<10
Toluene	T209	AR	10	µg/kg	<10	<10	<10	<10	<10
EthylBenzene	T209	AR	10	µg/kg	<10	<10	<10	<10	<10
M/P Xylene	T209	AR	10	µg/kg	<10	<10	<10	<10	<10
O Xylene	T209	AR	10	µg/kg	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	AR	10	µg/kg	<10	<10	<10	<10	<10
TPH (C5-C6 aliphatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C6-C7 aromatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C6-C8 aliphatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aromatic)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2	<2
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2	<2
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	<2	<2	<2	<2	<2
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	**19**	<2	<2	**3**	**3**
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	**2**	<2	<2	<2	<2
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	**250**	<2	<2	**55**	**31**
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	**13**	**2**	**3**	**9**	**9**
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	**360**	**19**	**12**	**110**	**86**

Index to symbols used in 702313-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Retained on 2mm is removed before analysis
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis
Asbestos subcontracted to REC Limited

Method Index

Value	Description
T258	Titration (Dichromate)
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T209	GC/MS (Head Space)(MCERTS)
T921	Colorimetry (CF) (MCERT)
T2	Grav
T7	Probe
T54	GC/MS (Headspace)
T16	GC/MS
T27	PLM
T162	Grav (1 Dec) (105 C)
T219	GC/FID (SE)
T245	ICP/OES (Aqua Regia Extraction)
T82	ICP/OES (Sim)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2	mg/kg	M	001-006,008-011
Arsenic	T257	A40	2.0	mg/kg	U	007
Barium	T257	A40	2	mg/kg	U	001-011
Beryllium	T245	A40	0.5	mg/kg	U	001-011
Boron (water-soluble)	T82	A40	1	mg/kg	N	001-011
Cadmium	T257	A40	0.1	mg/kg	M	001-006,008-011
Cadmium	T257	A40	0.1	mg/kg	U	007
Chromium	T257	A40	0.5	mg/kg	M	001-006,008-011
Chromium	T257	A40	0.5	mg/kg	U	007
Copper	T257	A40	2	mg/kg	M	001-006,008-011
Copper	T257	A40	2	mg/kg	U	007
Lead	T257	A40	2	mg/kg	M	001-006,008-011
Lead	T257	A40	2	mg/kg	U	007
Mercury	T245	A40	1.0	mg/kg	U	001-011
Nickel	T257	A40	0.5	mg/kg	M	001-006,008-011
Nickel	T257	A40	0.5	mg/kg	U	007
Selenium	T257	A40	3	mg/kg	U	001-011
Vanadium	T257	A40	0.1	mg/kg	U	001-011
Zinc	T257	A40	2	mg/kg	M	001-006,008-011
Zinc	T257	A40	2	mg/kg	U	007
Asbestos ID	T27	A40			SU	001-011
pH	T7	A40			M	001-006,008-011
pH	T7	A40			U	007
Organic Matter	T258	A40	0.5	%	N	001-011
Phenols(Mono)	T921	AR	1	mg/kg	M	001-006,008-011
Phenols(Mono)	T921	AR	1	mg/kg	U	007
Moisture @105C	T162	AR	0.1	%	N	001-011
Retained on 2mm	T2	A40	0.1	%	N	001-011
Benzene	T209	AR	10	µg/kg	M	001-006,008-011
Benzene	T209	AR	10	µg/kg	U	007
Toluene	T209	AR	10	µg/kg	M	001-006,008-011

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Toluene	T209	AR	10	µg/kg	U	007
EthylBenzene	T209	AR	10	µg/kg	M	001-006,008-011
EthylBenzene	T209	AR	10	µg/kg	U	007
M/P Xylene	T209	AR	10	µg/kg	M	001-006,008-011
M/P Xylene	T209	AR	10	µg/kg	U	007
O Xylene	T209	AR	10	µg/kg	M	001-006,008-011
O Xylene	T209	AR	10	µg/kg	U	007
Methyl tert-Butyl Ether	T209	AR	10	µg/kg	M	001-006,008-011
Methyl tert-Butyl Ether	T209	AR	10	µg/kg	U	007
TPH (C5-C6 aliphatic)	T54	AR	0.10	mg/kg	N	001-011
TPH (C6-C7 aromatic)	T54	AR	0.10	mg/kg	N	001-011
TPH (C6-C8 aliphatic)	T54	AR	0.10	mg/kg	N	001-011
TPH (C7-C8 aromatic)	T54	AR	0.10	mg/kg	N	001-011
TPH (C8-C10 aliphatic)	T54	AR	0.10	mg/kg	N	001-011
TPH (C8-C10 aromatic)	T54	AR	0.10	mg/kg	N	001-011
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	001-011
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	001-011
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	001-011
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	001-011
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	001-011
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	N	001-011
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	N	001-011
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	N	001-011
Naphthalene	T16	AR	0.1	mg/kg	U	001-011
Acenaphthylene	T16	AR	0.1	mg/kg	U	001-011
Acenaphthene	T16	AR	0.1	mg/kg	M	001-006,008-011
Acenaphthene	T16	AR	0.1	mg/kg	U	007
Fluorene	T16	AR	0.1	mg/kg	M	001-006,008-011
Fluorene	T16	AR	0.1	mg/kg	U	007
Phenanthrene	T16	AR	0.1	mg/kg	U	001-011
Anthracene	T16	AR	0.1	mg/kg	M	001-006,008-011
Anthracene	T16	AR	0.1	mg/kg	U	007
Fluoranthene	T16	AR	0.1	mg/kg	N	001-011
Pyrene	T16	AR	0.1	mg/kg	N	001-011
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	M	001-006,008-011
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	U	007
Chrysene	T16	AR	0.1	mg/kg	M	001-006,008-011
Chrysene	T16	AR	0.1	mg/kg	U	007
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	001-011
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	001-011
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	M	001-006,008-011
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	U	007
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	M	001-006,008-011
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	U	007
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	M	001-006,008-011
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	U	007
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	M	001-006,008-011
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	U	007
PAH(total)	T16	AR	0.1	mg/kg	U	001-011