APPENDIX D

Contamination Test Results and Assessment Criteria

Methodology for the Screening of Soils in Terms of the Risk to Human Health (Including the Opus Methodology for Calculating Tier 1 Soil Screening Values)

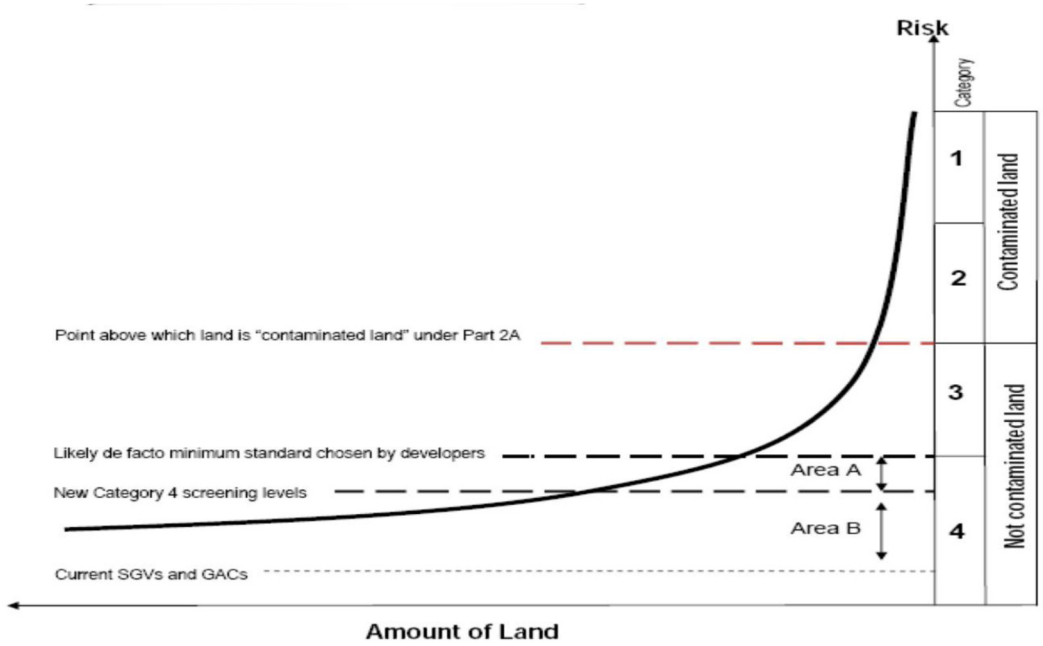
The legislative framework for the regulation of contaminated land is contained in Part 2A of the Environmental Protection Act 1990, which was implemented in the Contaminated Land (England) Regulations 2000 (and subsequent amendments). This legislation allows for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment. The basis of the UK contaminated land policy is the 'Suitable for Use' approach, which states that land should be suitable for its current use and made suitable for any new use as official permission (through the planning process) is given for that use.

Under Part 2A of the Environmental Protection Act 1990, contaminated land is defined as land where 'significant harm' is being caused or there is a 'significant possibility of such harm' being caused or where 'significant pollution of controlled waters' is being caused, or there is a 'significant possibility of such pollution' being caused. For contaminated land to occur under Part 2A, a contaminant linkage must exist i.e. there must be a contaminant, a relevant receptor and a plausible migration pathway by which the contaminant can impact the receptor.

In April 2012, the Part 2A Statutory Guidance was revised and this introduced four categories of land to assist in defining risk to human health from contaminated land. Statutory contaminated land comprises Category 1 (where significant harm is being caused) and Category 2 (where significant possibility of such harm (SPOSH) is being caused). Category 3 is land not capable of being determined as SPOSH and Category 4 is uncontaminated.

Under the National Planning Policy Framework (NPPF) introduced in England in April 2012, land should be suitable for its new use taking the effects of ground contamination into consideration. To this end, adequate site investigation should be undertaken and prepared by competent persons. After remediation, as a minimum, land should be incapable of being determined as Part 2A contaminated land. Where a site is affected by contamination, responsibility for securing safe development rests with the developer and/or landowner.

The Defra impact assessment report accompanying the revised Part 2A Statutory Guidance indicated that most developers will want to ensure that under the planning regime their land is safely within Category 4 and this is the approach adopted by Opus in the preparation of this report (see below):



To assist with the implementation of Part 2A and contamination assessments under the planning process, Defra has commissioned a research project to derive new Category 4 Screening Levels (C4SLs). On 27 March 2014, Defra published C4SLs for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead for six categories of land use, namely:

- Residential with home-grown produce;
- Residential without home-grown produce;
- Allotments;
- Commercial;
- Public open space 1 (public land near residential properties i.e. grassed area outside residential housing); and
- Public open space 2 (public land away from residential properties i.e. public parks).

The C4SLs differ from the existing Soil Guideline Values (SGVs) in that they are considered by Defra to be more pragmatic (albeit still strongly precautionary) and indicate the concentration of a contaminant in soil that would potentially pose a *'low risk'* to human health. Defra envisage that the new C4SLs will replace the current SGVs, which are considered indicative of *'minimal risk'*, and were derived using version 1.06 of the Contaminated Land Exposure Assessment (CLEA) model.

Where no C4SLs and SGVs exist for certain contaminants, Opus has derived Tier 1 soil screening values (SSVs) and is currently utilising Version 2014.1, dated 15 April 2014. These Tier 1 SSVs are compliant with the Environment Agency's recommended approach, as set out in CLEA version 1.06, and are a measure of *'minimal risk'* to human health rather than *'low risk'*. Opus has currently derived Tier 1 SSVs for four categories of land use, namely:

- Residential with home-grown produce;
- Residential without home-grown produce;
- Allotments;
- Commercial.

The Tier 1 risk assessment methodology employed by Opus in this report is as follows:

Firstly, reference has been made to the published C4SLs. However, for compounds where there are no C4SLs available, reference has been made to Environment Agency SGVs (toluene, ethylbenzene, xylene, mercury, nickel, phenol and selenium) at a suitable soil organic matter (SOM) content.

For compounds where no C4SLs and SGVs have been published, Opus has derived Tier 1 SSVs utilising United Kingdom based toxicological data, where available. However, where a TOX report is not available, reference has been made to the Risk Assessment Information System (RAIS) database and other relevant toxicological database publications for toxicological information.

In relation to the petroleum hydrocarbon fractions, Opus has followed the procedures presented within the Mole Valley District Council position paper (Human Health Generic Assessment Criteria for Petroleum Hydrocarbons, dated May 2009). This document follows the procedures set out in the Environment Agency publications SC050021/SR7 and P5-080/TR3 (The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils). In addition, the Tier 1 soil screening values do not consider the additive or synergistic effects of any compounds.

The default parameters have been utilised when running the CLEA model at a Tier 1 level to provide a suitably conservative output. Tier 1 SSVs have been derived at 0.25%, 1.0%, 3.0% and 6% soil organic matter (SOM) contents, to accord with current SGVs where a SOM of 6% has been adopted, but also to assess natural soils, which typically have a lower % SOM.

With regards to plant uptake, the guidance offered by the Environment Agency within their publication SC50021/SR3 has been adopted with relevant soil parameters being adjusted to 10°C where possible.

The C4SLs have presently only been published for a sand soil type at 6% SOM content. The modified version of the CLEA model used to derive the new C4SLs has not been published at the time of writing. Therefore it is

impractical for practitioners, such as Opus, to derive in-house soil screening values using the C4SL methodology for other soil types or SOM contents. Therefore, it may be necessary to utilise C4SLs and SGVs for the same contaminants of concern if the soil under consideration has a lower % SOM content (i.e. less than 6%).

For contaminants of concern which have no C4SL, SGV or Opus Tier 1 SSV, reference may have been made to other published generic assessment criteria (as referenced in the report), including:

- LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Edition), dated 2009;
- EIC/AGS/CL:AIRE publication 'Soil Generic Assessment Criteria for Human Health Risk Assessment', dated January 2010; and
- Atkins ATRISK^{soil} Soil Screening Values.

The other generic assessment criteria listed above are also indicative of '*minimal risk*' to human health as is the case with the SGVs and Opus Tier 1 SSVs.

Mean Value Test

J-M0167.00
Made Ground
Metals
pH - 9

Key:	
	exceeds screen and is potential outlier
	Does not exceed screen but may be outlier
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CAS REG No	Determinand	Units	*Screening Value	*Source of screening value	Sample Ref														LEVEL 1 CHECK											
					trial pit / borehole ref	TP1	TP2	TP5	TP6	TP10	TP14	WS1	WS2	WS3	WS5	WS11	WS12	WS15	WS16	No of samples in the averaging area	Degrees of freedom	Arithmetic Mean	standard deviation	Coefficient of variation	*confidence bound required (%)	t value	normalised upper bound on confidence limit of population	Normalised upper bound (95% UCL of mean)	Soil Guideline Value	Source for SGV	Upper Bound less than the guideline value?	Action - note if no further action indicated still do maximum value test
					Depth	0.05	1.5	0.3	0.5	0.3	0.1	0.8-1.0	0.4-0.5	0.3-0.4	0.1-0.4	0.5-0.6	0.4-0.5	0.4-0.5	0.3-0.4													
	Arsenic	mg/kg	640	Opus UK Teir 1 SV's V2014.2		6.00	5.00	5.00	4.00	7.00	5.00	3.00	6.00	6.00	7.00	4.00	8.00	2.00	11.00	14	13	5.64	2.24	0.11	95	1.771	1.188	**6.70**	640	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Cadmium	mg/kg	410	Opus UK Teir 1 SV's V2014.2		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	14	13	0.50	0.00	0.00	95	1.771	1.000	**0.50**	410	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Chromium IV	mg/kg	49	Opus UK Teir 1 SV's V2014.2		15.00	21.00	24.00	16.00	17.00	13.00	29.00	20.00	21.00	22.00	24.00	23.00	19.00	21.00	14	13	20.36	4.18	0.05	95	1.771	1.097	**22.34**	49	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Lead	mg/kg	2330	Opus UK Teir 1 SV's V2014.2		51.00	23.00	45.00	19.00	28.00	49.00	13.00	65.00	20.00	137.00	16.00	129.00	6.00	71.00	14	13	34.04	41.12	0.32	95	1.771	1.572	**53.50**	2330	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Mercury	mg/kg	3600	Opus UK Teir 1 SV's V2014.2		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.20	1.00	1.00	1.00	1.00	14	13	1.09	0.32	0.08	95	1.771	1.140	**1.24**	3600	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Nickel	mg/kg	1800	Opus UK Teir 1 SV's V2014.2		13.00	16.00	16.00	15.00	10.00	13.00	22.00	16.00	17.00	19.00	20.00	18.00	8.00	26.00	14	13	16.36	4.67	0.08	95	1.771	1.135	**18.57**	1800	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Selenium	mg/kg	13000	Opus UK Teir 1 SV's V2014.2		3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	14	13	3.00	0.00	0.00	95	1.771	1.000	**3.00**	13000	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Copper	mg/kg	8340	Opus UK Teir 1 SV's V2014.2		25.00	11.00	13.00	9.00	8.00	20.00	10.00	18.00	20.00	37.00	16.00	32.00	5.00	26.00	14	13	17.86	9.49	0.14	95	1.771	1.251	**22.35**	8340	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Zinc	mg/kg	38000	Opus UK Teir 1 SV's V2014.2		92.00	72.00	65.00	41.00	55.00	80.00	50.00	62.00	49.00	98.00	51.00	84.00	16.00	67.00	14	13	63.00	21.78	0.09	95	1.771	1.164	**73.31**	38000	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Boron	mg/kg	59	Opus UK Teir 1 SV's V2014.2		2.90	1.00	1.00	1.00	1.00	2.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	14	13	1.27	0.69	0.15	95	1.771	1.257	**1.60**	59	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted

Mean Value Test

J-M0167.00
Natural
Metals
pH - 9

Key:	
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CAS REG No	Determinand	Units	*Screening Value	*Source of screening value	Sample Ref							LEVEL 1 CHECK											
					trial pit / borehole ref	TP6	WS4	WS7	WS9	WS10	WS14	WS15	No of samples in the averaging area	Degrees of freedom	Arithmetic Mean	standard deviation	Coefficient of variation	*confidence bound required (%)	t value	normalised upper bound on confidence limit of population	Normalised upper bound (95% UCL of mean)	Soil Guideline Value	Source for SGV	Upper Bound less than the guideline value?	Action - note if no further action indicated still do maximum value test
					Depth	1	0.1-0.4	1.6-1.8	0.4-0.5	0.5-0.6	0.7-0.8	0.4-0.5													
	Arsenic	mg/kg	640	Opus UK Teir 1 SV's V2014.2		6.00	7.00	8.00	2.00	4.00	6.00	2.00	7	6	5.00	2.38	0.18	95	1.943	1.350	**6.75**	640	Opus UK Teir 1 SV's V2014.2	YES	No action warranted
	Cadmium	mg/kg	410	Opus UK Teir 1 SV's V2014.2		0.50	0.50	0.50	0.50	0.50	0.50	0.50	7	6	0.50	0.00	0.00	95	1.943	1.000	**0.50**	410	Opus UK Teir 1 SV's V2014.2	YES	No action warranted
	Chromium IV	mg/kg	49	Opus UK Teir 1 SV's V2014.2		37.00	33.00	16.00	11.00	14.00	19.00	19.00	7	6	21.29	9.84	0.17	95	1.943	1.340	**28.52**	49	Opus UK Teir 1 SV's V2014.2	YES	No action warranted
	Lead	mg/kg	2330	Opus UK Teir 1 SV's V2014.2		1.00	19.00	8.00	15.00	15.00	59.00	6.00	7	6	10.28	19.29	0.71	95	1.943	2.378	**24.44**	2330	Opus UK Teir 1 SV's V2014.2	YES	No action warranted
	Mercury	mg/kg	3600	Opus UK Teir 1 SV's V2014.2		27.00	1.00	1.00	1.00	1.00	1.00	1.00	7	6	4.71	9.83	0.79	95	1.943	2.531	**11.93**	3600	Opus UK Teir 1 SV's V2014.2	YES	No action warranted
	Nickel	mg/kg	1800	Opus UK Teir 1 SV's V2014.2		3.00	30.00	19.00	9.00	12.00	31.00	8.00	7	6	16.00	11.02	0.26	95	1.943	1.506	**24.09**	1800	Opus UK Teir 1 SV's V2014.2	YES	No action warranted
	Selenium	mg/kg	13000	Opus UK Teir 1 SV's V2014.2		3.00	3.00	3.00	3.00	3.00	3.00	3.00	7	6	3.00	0.00	0.00	95	1.943	1.000	**3.00**	13000	Opus UK Teir 1 SV's V2014.2	YES	No action warranted
	Copper	mg/kg	8340	Opus UK Teir 1 SV's V2014.2		17.00	15.00	12.00	8.00	10.00	51.00	5.00	7	6	16.86	15.59	0.35	95	1.943	1.679	**28.31**	8340	Opus UK Teir 1 SV's V2014.2	YES	No action warranted
	Zinc	mg/kg	38000	Opus UK Teir 1 SV's V2014.2		62.00	52.00	27.00	19.00	27.00	72.00	16.00	7	6	39.29	22.37	0.22	95	1.943	1.418	**55.72**	38000	Opus UK Teir 1 SV's V2014.2	YES	No action warranted
	Boron	mg/kg	59	Opus UK Teir 1 SV's V2014.2		1.00	1.00	1.00	1.00	1.00	1.00	1.00	7	6	1.00	0.00	0.00	95	1.943	1.000	**1.00**	59	Opus UK Teir 1 SV's V2014.2	YES	No action warranted

Mean Value Test

J-M0167.00
Made Ground
PAH
Organics - 3% SOM Scenario

Key:	
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CAS REG No	Determinand	Units	*Screening Value	*Source of screening value	Sample Ref								LEVEL 1 CHECK											
					trial pit / borehole ref	TP5	TP14	WS1	WS2	WS3	WS11	WS15	WS16	No of samples in the averaging area	Degrees of freedom	Arithmetic Mean	standard deviation	Coefficient of variation	*confidence bound required (%)	t value	normalised upper bound on confidence limit of population	Normalised upper bound (95% UCL of mean)	Soil Guideline Value	Source for SGV	Upper Bound less than the guideline value?	Action - **note if no further action indicated still do maximum value test**
					Depth	0.3	0.1	0.8-1	0.4-0.5	0.3-0.4	0.5-0.6	0.4-0.5	0.3-0.4													
	Naphthalene	mg/kg	220	Opus UK Teir 1 SV's V2014.2		0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	8	7	0.10	0.00	0.00	95	1.895	1.000	**0.10**	220	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Acenaphthene	mg/kg	9.2	Opus UK Teir 1 SV's V2014.2		0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	8	7	0.10	0.00	0.00	95	1.895	1.000	**0.10**	9.2	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Fluorene	mg/kg	72700	Opus UK Teir 1 SV's V2014.2		0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	8	7	0.10	0.00	0.00	95	1.895	1.000	**0.10**	72700	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Anthracene	mg/kg	530000	Opus UK Teir 1 SV's V2014.2		0.100	0.100	0.100	0.350	0.220	0.100	0.110	0.100	8	7	0.15	0.09	0.22	95	1.895	1.417	**0.21**	530000	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Fluoranthene	mg/kg	72600	Opus UK Teir 1 SV's V2014.2		0.270	0.600	0.700	2.740	1.670	0.100	0.680	1.580	8	7	1.04	0.89	0.30	95	1.895	1.569	**1.64**	72600	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Pyrene	mg/kg	54500	Opus UK Teir 1 SV's V2014.2		0.230	1.080	0.560	2.480	1.490	0.100	0.500	1.350	8	7	0.97	0.79	0.29	95	1.895	1.545	**1.50**	54500	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Benzo(a)anthracene	mg/kg	140	Opus UK Teir 1 SV's V2014.2		0.130	0.560	0.500	1.520	0.890	0.100	0.310	0.760	8	7	0.60	0.47	0.28	95	1.895	1.524	**0.91**	140	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Chrysene	mg/kg	14000	Opus UK Teir 1 SV's V2014.2		0.170	0.580	0.560	1.540	0.920	0.100	0.320	0.840	8	7	0.63	0.47	0.26	95	1.895	1.502	**0.94**	14000	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Benzo(b)fluoranthene	mg/kg	140	Opus UK Teir 1 SV's V2014.2		0.180	0.680	0.990	1.980	1.240	0.100	0.400	1.060	8	7	0.83	0.62	0.27	95	1.895	1.505	**1.25**	140	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Benzo(k)fluoranthene	mg/kg	1430	Opus UK Teir 1 SV's V2014.2		0.100	0.270	0.350	0.730	0.450	0.100	0.130	0.480	8	7	0.33	0.22	0.24	95	1.895	1.457	**0.48**	1430	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Benzo(a)pyrene	mg/kg	14	Opus UK Teir 1 SV's V2014.2		0.140	0.530	0.740	1.620	1.000	0.100	0.230	0.820	8	7	0.65	0.51	0.28	95	1.895	1.532	**0.99**	14	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Indeno(123cd)pyrene	mg/kg	140	Opus UK Teir 1 SV's V2014.2		0.100	0.250	0.470	0.880	0.530	0.100	0.150	0.450	8	7	0.37	0.27	0.26	95	1.895	1.494	**0.55**	140	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted
	Dibenzo(ah)anthracene	mg/kg	14	Opus UK Teir 1 SV's V2014.2		0.100	0.100	0.100	0.140	0.100	0.100	0.100	0.100	8	7	0.11	0.01	0.05	95	1.895	1.090	**0.11**	14	Opus UK Teir 1 SV's V2014.2	***YES***	No action warranted

Mean Value Test

J-M0167.00
Natural
PAH
Organics - 3% SOM Scenario

Key:	
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CAS REG No	Determinand	Units	*Screening Value	*Source of screening value	Sample Ref		LEVEL 1 CHECK											
					trial pit / borehole ref	TP6	WS14											
					Depth	1.0	0.7-0.8											
								No of samples in the averaging area	Degrees of freedom	Arithmetic Mean	standard deviation	Coefficient of variation	*confidence bound required (%)	t value	normalised upper bound on confidence limit of population	Normalised upper bound (95% UCL of mean)	Soil Guideline Value	Source for SGV	Upper Bound less than the guideline value?	Action - note if no further action indicated still do maximum value test
	Naphthalene	mg/kg	220	Opus UK Teir 1 SV's V2014.2	0.100	0.110		2	1	0.11	0.01	0.05	95	6.314	1.301	**0.14**	220	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Acenaphthene	mg/kg	9.2	Opus UK Teir 1 SV's V2014.2	0.100	0.100		2	1	0.10	0.00	0.00	95	6.314	1.000	**0.10**	9.2	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Fluorene	mg/kg	72700	Opus UK Teir 1 SV's V2014.2	0.100	0.100		2	1	0.10	0.00	0.00	95	6.314	1.000	**0.10**	72700	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Anthracene	mg/kg	530000	Opus UK Teir 1 SV's V2014.2	0.130	0.100		2	1	0.12	0.02	0.13	95	6.314	1.824	**0.21**	530000	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Fluoranthene	mg/kg	72600	Opus UK Teir 1 SV's V2014.2	1.200	1.110		2	1	1.16	0.06	0.04	95	6.314	1.246	**1.44**	72600	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Pyrene	mg/kg	54500	Opus UK Teir 1 SV's V2014.2	1.080	0.990		2	1	1.04	0.06	0.04	95	6.314	1.275	**1.32**	54500	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Benzo(a)anthracene	mg/kg	140	Opus UK Teir 1 SV's V2014.2	0.560	0.740		2	1	0.65	0.13	0.14	95	6.314	1.874	**1.22**	140	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Chrysene	mg/kg	14000	Opus UK Teir 1 SV's V2014.2	0.580	0.720		2	1	0.65	0.10	0.11	95	6.314	1.680	**1.09**	14000	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Benzo(b)fluoranthene	mg/kg	140	Opus UK Teir 1 SV's V2014.2	0.680	0.840		2	1	0.76	0.11	0.11	95	6.314	1.665	**1.27**	140	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Benzo(k)fluoranthene	mg/kg	1430	Opus UK Teir 1 SV's V2014.2	0.270	0.280		2	1	0.28	0.01	0.02	95	6.314	1.115	**0.31**	1430	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Benzo(a)pyrene	mg/kg	14	Opus UK Teir 1 SV's V2014.2	0.530	0.700		2	1	0.62	0.12	0.14	95	6.314	1.873	**1.15**	14	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Indeno(123cd)pyrene	mg/kg	140	Opus UK Teir 1 SV's V2014.2	0.250	0.350		2	1	0.30	0.07	0.17	95	6.314	2.052	**0.62**	140	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted
	Dibenzo(ah)anthracene	mg/kg	14	Opus UK Teir 1 SV's V2014.2	0.100	0.100		2	1	0.10	0.00	0.00	95	6.314	1.000	**0.10**	14	Opus UK Teir 1 SV's V2014.2	*YES*	No action warranted

Emma Small
Opus International
Letchworth House
2 Chesney Wold
Bleak Hall
Milton Keynes
MK6 1NE

QTS Environmental Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 851105
russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 13-14777

Site Reference:	Hayes
Project / Job Ref:	J-M0167.00
Order No:	MK 04529
Sample Receipt Date:	28/05/2013
Sample Scheduled Date:	29/05/2013
Report Issue Number:	1
Reporting Date:	04/06/2013

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

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Soil Analysis Certificate						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Opus International	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hayes	**TP / BH No**	TP1	TP1	TP1	TP2	TP2
Project / Job Ref: J-M0167.00	**Additional Refs**	D1	D3	D4	D2	D4
Order No: MK 04529	**Depth (m)**	0.05	1.00	2.20	1.50	2.60
Reporting Date: 04/06/2013	**QTSE Sample No**	70214	70215	70216	70217	70218

Determinand	Unit	MDL	Accreditation					
Asbestos Screen [S]	N/a	N/a	ISO17025		None Detected			
pH	pH Units	N / a	MCERTS	7.4		11.7	12.0	9.8
Total Cyanide	mg/kg	< 2	NONE					
Total Sulphate as SO_4	mg/kg	< 200	NONE			5912		285
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	NONE			0.03		0.05
Total Sulphur	mg/kg	< 200	NONE			2075		< 200
Sulphide	mg/kg	< 5	NONE					
Total Organic Carbon (TOC)	%	< 0.1	NONE	6.9				
Arsenic (As)	mg/kg	< 2	MCERTS	6			5	
W/S Boron	mg/kg	< 1	NONE	2.9			< 1	
Cadmium (Cd)	mg/kg	< 0.5	MCERTS	< 0.5			< 0.5	
Chromium (Cr)	mg/kg	< 2	MCERTS	15			21	
Copper (Cu)	mg/kg	< 4	MCERTS	25			11	
Lead (Pb)	mg/kg	< 3	MCERTS	51			23	
Mercury (Hg)	mg/kg	< 1	NONE	< 1			< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	13			16	
Selenium (Se)	mg/kg	< 3	NONE	< 3			< 3	
Zinc (Zn)	mg/kg	< 3	MCERTS	92			72	
Total Phenols (monohydric)	mg/kg	< 2	NONE					

Analytical results are expressed on a dry weight basis where samples are dried at less than 30^{O}C
Analysis carried out on the dried sample is corrected for the stone content
Subcontracted analysis [S]

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

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Soil Analysis Certificate						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Opus International	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hayes	**TP / BH No**	TP3	TP5	TP6	TP6	TP9
Project / Job Ref: J-M0167.00	**Additional Refs**	D2	D1	D2	D3	D1
Order No: MK 04529	**Depth (m)**	0.60	0.30	0.50	1.00	0.30
Reporting Date: 04/06/2013	**QTSE Sample No**	70219	70220	70221	70222	70223

Determinand	Unit	MDL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	None Detected		None Detected		None Detected
pH	pH Units	N / a	MCERTS		8.9	11.8	11.2	
Total Cyanide	mg/kg	< 2	NONE		< 2		< 2	
Total Sulphate as SO_4	mg/kg	< 200	NONE		801		1575	
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	NONE		0.16		0.36	
Total Sulphur	mg/kg	< 200	NONE				524	
Sulphide	mg/kg	< 5	NONE		< 5		< 5	
Total Organic Carbon (TOC)	%	< 0.1	NONE		1.2		0.5	
Arsenic (As)	mg/kg	< 2	MCERTS		5	4	6	
W/S Boron	mg/kg	< 1	NONE		< 1	< 1	< 1	
Cadmium (Cd)	mg/kg	< 0.5	MCERTS		< 0.5	< 0.5	< 0.5	
Chromium (Cr)	mg/kg	< 2	MCERTS		24	16	37	
Copper (Cu)	mg/kg	< 4	MCERTS		13	9	17	
Lead (Pb)	mg/kg	< 3	MCERTS		45	19	19	
Mercury (Hg)	mg/kg	< 1	NONE		< 1	< 1	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS		16	15	27	
Selenium (Se)	mg/kg	< 3	NONE		< 3	< 3	< 3	
Zinc (Zn)	mg/kg	< 3	MCERTS		65	41	62	
Total Phenols (monohydric)	mg/kg	< 2	NONE		< 2		< 2	

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Subcontracted analysis (S)

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

4480

Soil Analysis Certificate						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Opus International	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hayes	**TP / BH No**	TP10	TP12	TP14	TP14	WS1
Project / Job Ref: J-M0167.00	**Additional Refs**	D1	D2	D1	D2	ES1
Order No: MK 04529	**Depth (m)**	0.30	1.20	0.10	1.50	0.80 - 1.00
Reporting Date: 04/06/2013	**QTSE Sample No**	70224	70225	70226	70227	70228

Determinand	Unit	MDL	Accreditation					
Asbestos Screen [S]	N/a	N/a	ISO17025		None Detected		None Detected	
pH	pH Units	N / a	MCERTS	8.7	11.7	8.6		8.0
Total Cyanide	mg/kg	< 2	NONE			< 2		< 2
Total Sulphate as SO_4	mg/kg	< 200	NONE		6945	1492		429
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	NONE		0.07	0.19		0.10
Total Sulphur	mg/kg	< 200	NONE		2317			
Sulphide	mg/kg	< 5	NONE			< 5		< 5
Total Organic Carbon (TOC)	%	< 0.1	NONE	0.8		5.8		
Arsenic (As)	mg/kg	< 2	MCERTS	7		5		3
W/S Boron	mg/kg	< 1	NONE	< 1		2.9		< 1
Cadmium (Cd)	mg/kg	< 0.5	MCERTS	< 0.5		< 0.5		< 0.5
Chromium (Cr)	mg/kg	< 2	MCERTS	17		13		29
Copper (Cu)	mg/kg	< 4	MCERTS	8		20		10
Lead (Pb)	mg/kg	< 3	MCERTS	28		49		13
Mercury (Hg)	mg/kg	< 1	NONE	< 1		< 1		< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	10		13		22
Selenium (Se)	mg/kg	< 3	NONE	< 3		< 3		< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	55		80		50
Total Phenols (monohydric)	mg/kg	< 2	NONE			< 2		< 2

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Subcontracted analysis [S]

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

4480

Soil Analysis Certificate						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Opus International	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hayes	**TP / BH No**	WS2	WS3	WS4	WS5	WS5
Project / Job Ref: J-M0167.00	**Additional Refs**	ES1	ES1	ES2	ES1	ES2
Order No: MK 04529	**Depth (m)**	0.40 - 0.50	0.30 - 0.40	1.10 - 1.20	0.10 - 0.40	1.50 - 1.70
Reporting Date: 04/06/2013	**QTSE Sample No**	70229	70230	70231	70232	70233

Determinand	Unit	MDL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	None Detected				
pH	pH Units	N / a	MCERTS	12.1	12.0	10.1	6.6	6.9
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2			
Total Sulphate as SO_4	mg/kg	< 200	NONE	8345	5697			< 200
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	NONE	0.02	0.04			0.02
Total Sulphur	mg/kg	< 200	NONE					< 200
Sulphide	mg/kg	< 5	NONE	< 5	< 5			
Total Organic Carbon (TOC)	%	< 0.1	NONE				1.4	
Arsenic (As)	mg/kg	< 2	MCERTS	6	6	7	7	
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
Cadmium (Cd)	mg/kg	< 0.5	MCERTS	< 0.5	< 0.5	< 0.5	< 0.5	
Chromium (Cr)	mg/kg	< 2	MCERTS	20	21	33	22	
Copper (Cu)	mg/kg	< 4	MCERTS	18	12	15	37	
Lead (Pb)	mg/kg	< 3	MCERTS	65	20	19	137	
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	2.2	
Nickel (Ni)	mg/kg	< 3	MCERTS	16	17	30	19	
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	
Zinc (Zn)	mg/kg	< 3	MCERTS	62	49	52	98	
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2			

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Subcontracted analysis (S)

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

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Soil Analysis Certificate						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Opus International	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hayes	**TP / BH No**	WS7	WS9	WS10	WS10	WS11
Project / Job Ref: J-M0167.00	**Additional Refs**	ES2	ES1	ES1	ES2	ES1
Order No: MK 04529	**Depth (m)**	1.60 - 1.80	0.40 - 0.50	0.50 - 0.60	0.80 - 1.00	0.50 - 0.60
Reporting Date: 04/06/2013	**QTSE Sample No**	70234	70235	70236	70237	70238

Determinand	Unit	MDL	Accreditation					
Asbestos Screen [S]	N/a	N/a	ISO17025					
pH	pH Units	N / a	MCERTS	9.4	9.2	9.8	8.5	7.5
Total Cyanide	mg/kg	< 2	NONE					< 2
Total Sulphate as SO_4	mg/kg	< 200	NONE	303			364	422
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	NONE	0.06			0.07	0.12
Total Sulphur	mg/kg	< 200	NONE	< 200			< 200	
Sulphide	mg/kg	< 5	NONE					< 5
Total Organic Carbon (TOC)	%	< 0.1	NONE					0.6
Arsenic (As)	mg/kg	< 2	MCERTS	8	2	4		4
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1		< 1
Cadmium (Cd)	mg/kg	< 0.5	MCERTS	< 0.5	< 0.5	< 0.5		< 0.5
Chromium (Cr)	mg/kg	< 2	MCERTS	16	11	14		24
Copper (Cu)	mg/kg	< 4	MCERTS	12	8	10		9
Lead (Pb)	mg/kg	< 3	MCERTS	8	15	15		16
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1		< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	19	9	12		20
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3		< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	27	19	27		51
Total Phenols (monohydric)	mg/kg	< 2	NONE					< 2

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Subcontracted analysis [S]

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

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Soil Analysis Certificate						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Opus International	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hayes	**TP / BH No**	WS12	WS14	WS14	WS15	WS16
Project / Job Ref: J-M0167.00	**Additional Refs**	WS1	ES1	ES2	ES1	ES1
Order No: MK 04529	**Depth (m)**	0.40 - 0.50	0.70 - 0.80	1.00 - 1.10	0.40 - 0.50	0.30 - 0.40
Reporting Date: 04/06/2013	**QTSE Sample No**	70239	70241	70242	70243	70244

Determinand	Unit	MDL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025		None Detected			None Detected
pH	pH Units	N / a	MCERTS	7.9	9.9	7.1	7.1	7.8
Total Cyanide	mg/kg	< 2	NONE		< 2		< 2	< 2
Total Sulphate as SO_4	mg/kg	< 200	NONE		5650	277	< 200	413
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	NONE		0.09	0.05	0.02	0.03
Total Sulphur	mg/kg	< 200	NONE			< 200		
Sulphide	mg/kg	< 5	NONE		< 5		< 5	< 5
Total Organic Carbon (TOC)	%	< 0.1	NONE	1.6			0.3	
Arsenic (As)	mg/kg	< 2	MCERTS	8	6		< 2	11
W/S Boron	mg/kg	< 1	NONE	< 1	< 1		< 1	< 1
Cadmium (Cd)	mg/kg	< 0.5	MCERTS	< 0.5	< 0.5		< 0.5	< 0.5
Chromium (Cr)	mg/kg	< 2	MCERTS	23	19		19	21
Copper (Cu)	mg/kg	< 4	MCERTS	32	51		5	26
Lead (Pb)	mg/kg	< 3	MCERTS	129	59		6	71
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1		< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	18	31		8	26
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3		< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	84	72		16	67
Total Phenols (monohydric)	mg/kg	< 2	NONE		< 2		< 2	< 2

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Analysis carried out on the dried sample is corrected for the stone content
Subcontracted analysis (S)

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

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Soil Analysis Certificate						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied				
Opus International	**Time Sampled**	None Supplied				
Site Reference: Hayes	**TP / BH No**	WS16				
Project / Job Ref: J-M0167.00	**Additional Refs**	ES2				
Order No: MK 04529	**Depth (m)**	0.80 - 0.90				
Reporting Date: 04/06/2013	**QTSE Sample No**	70245				

Determinand	Unit	MDL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025					
pH	pH Units	N / a	MCERTS	7.0				
Total Cyanide	mg/kg	< 2	NONE					
Total Sulphate as SO_4	mg/kg	< 200	NONE	616				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	NONE	0.01				
Total Sulphur	mg/kg	< 200	NONE	281				
Sulphide	mg/kg	< 5	NONE					
Total Organic Carbon (TOC)	%	< 0.1	NONE					
Arsenic (As)	mg/kg	< 2	MCERTS					
W/S Boron	mg/kg	< 1	NONE					
Cadmium (Cd)	mg/kg	< 0.5	MCERTS					
Chromium (Cr)	mg/kg	< 2	MCERTS					
Copper (Cu)	mg/kg	< 4	MCERTS					
Lead (Pb)	mg/kg	< 3	MCERTS					
Mercury (Hg)	mg/kg	< 1	NONE					
Nickel (Ni)	mg/kg	< 3	MCERTS					
Selenium (Se)	mg/kg	< 3	NONE					
Zinc (Zn)	mg/kg	< 3	MCERTS					
Total Phenols (monohydric)	mg/kg	< 2	NONE					

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Subcontracted analysis (S)

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

4480

Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Opus International	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hayes	**TP / BH No**	TP5	TP6	TP14	WS1	WS2
Project / Job Ref: J-M0167.00	**Additional Refs**	D1	D3	D1	ES1	ES1
Order No: MK 04529	**Depth (m)**	0.30	1.00	0.10	0.80 - 1.00	0.40 - 0.50
Reporting Date: 04/06/2013	**QTSE Sample No**	70220	70222	70226	70228	70229

Determinand	Unit	MDL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.18
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	0.15	0.66	< 0.1	0.32	1.48
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.13	< 0.1	< 0.1	0.35
Fluoranthene	mg/kg	< 0.1	MCERTS	0.27	1.20	0.60	0.70	2.74
Pyrene	mg/kg	< 0.1	MCERTS	0.23	1.08	0.52	0.56	2.48
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.13	0.56	0.28	0.50	1.52
Chrysene	mg/kg	< 0.1	MCERTS	0.17	0.58	0.33	0.56	1.54
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.18	0.68	0.44	0.99	1.98
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.27	0.15	0.35	0.73
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.14	0.53	0.27	0.74	1.62
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.25	0.18	0.47	0.88
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.14
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	0.20	0.14	0.38	0.71
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	6.1	2.9	5.6	16.4

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

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

4480

Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Opus International	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hayes	**TP / BH No**	WS3	WS11	WS14	WS15	WS16
Project / Job Ref: J-M0167.00	**Additional Refs**	ES1	ES1	ES1	ES1	ES1
Order No: MK 04529	**Depth (m)**	0.30 - 0.40	0.50 - 0.60	0.70 - 0.80	0.40 - 0.50	0.30 - 0.40
Reporting Date: 04/06/2013	**QTSE Sample No**	70230	70238	70241	70243	70244

Determinand	Unit	MDL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.11	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	0.90	< 0.1	0.74	0.39	0.55
Anthracene	mg/kg	< 0.1	MCERTS	0.22	< 0.1	0.22	0.11	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	1.67	< 0.1	1.11	0.68	1.58
Pyrene	mg/kg	< 0.1	MCERTS	1.49	< 0.1	0.99	0.50	1.35
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.89	< 0.1	0.74	0.31	0.76
Chrysene	mg/kg	< 0.1	MCERTS	0.92	< 0.1	0.72	0.32	0.84
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	1.24	< 0.1	0.84	0.40	1.06
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.45	< 0.1	0.28	0.13	0.48
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	1	< 0.1	0.70	0.23	0.82
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.53	< 0.1	0.35	0.15	0.45
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.42	< 0.1	0.27	0.11	0.38
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	9.7	< 1.6	7.1	3.3	8.3

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

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

Soil Analysis Certificate - TPH CWG Banded						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Opus International	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hayes	**TP / BH No**	TP6	TP9	WS12	WS13	WS14
Project / Job Ref: J-M0167.00	**Additional Refs**	D3	D1	WS1	ES1	ES2
Order No: MK 04529	**Depth (m)**	1.00	0.30	0.40 - 0.50	0.40 - 0.50	1.00 - 1.10
Reporting Date: 04/06/2013	**QTSE Sample No**	70222	70223	70239	70240	70242

Determinand	Unit	MDL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aliphatic >C10 - C12	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aliphatic >C12 - C16	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aliphatic >C16 - C21	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aliphatic >C21 - C34	mg/kg	< 6	NONE	< 6	< 6	< 6	8	< 6
Aliphatic (C5 - C34)	mg/kg	< 12	NONE	< 12	< 12	< 12	< 12	< 12
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aromatic >C10 - C12	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aromatic >C12 - C16	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aromatic >C16 - C21	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Aromatic >C21 - C35	mg/kg	< 6	NONE	9	8	7	10	< 6
Aromatic (C5 - C35)	mg/kg	< 12	NONE	< 12	< 12	< 12	< 12	< 12
Total >C5 - C35	mg/kg	< 24	NONE	< 24	< 24	< 24	< 24	< 24

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QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 13-14777	**Date Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Opus International	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Hayes	**TP / BH No**	TP6	TP9	WS12	WS13	WS14
Project / Job Ref: J-M0167.00	**Additional Refs**	D3	D1	WS1	ES1	ES2
Order No: MK 04529	**Depth (m)**	1.00	0.30	0.40 - 0.50	0.40 - 0.50	1.00 - 1.10
Reporting Date: 04/06/2013	**QTSE Sample No**	70222	70223	70239	70240	70242

Determinand	Unit	MDL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
p & m-xylene	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
o-xylene	ug/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

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

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
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Maidstone
Kent ME17 2JN
Tel : 01622 851105

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 13-14777	
Opus International	
Site Reference: Hayes	
Project / Job Ref: J-M0167.00	
Order No: MK 04529	
Reporting Date: 04/06/2013	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
70214	TP1	D1	0.05	21.4	Grey sandy loam with vegetation
70216	TP1	D4	2.20	4.7	Beige gravelly sand with concrete and vegetation
70217	TP2	D2	1.50	15.9	Beige gravelly sand with concrete and vegetation
70218	TP2	D4	2.60	7.9	Beige gravelly sand with concrete
70220	TP5	D1	0.30	14	Orange sandy gravel with stones
70221	TP6	D2	0.50	8.9	Light grey gravelly sand with concrete
70222	TP6	D3	1.00	18.7	Light brown sandy clay with concrete
70223	TP9	D1	0.30	14.3	Light grey gravelly sand with concrete
70224	TP10	D1	0.30	10.8	Light brown clay
70225	TP12	D2	1.20	11	Brown clayey loam with vegetation and brick
70226	TP14	D1	0.10	18.6	Brown sandy loam with vegetation and stones
70228	WS1	ES1	0.80 - 1.00	14	Light grey clay with stones
70229	WS2	ES1	0.40 - 0.50	10.2	Light grey gravelly sand with concrete
70230	WS3	ES1	0.30 - 0.40	11.3	Light brown gravelly sand with concrete
70231	WS4	ES2	1.10 - 1.20	15.8	Light grey clay with stones
70232	WS5	ES1	0.10 - 0.40	10.4	Brown clayey loam with stones
70233	WS5	ES2	1.50 - 1.70	5.8	Orange gravelly clay with stones
70234	WS7	ES2	1.60 - 1.80	9.9	Orange sandy gravel with stones
70235	WS9	ES1	0.40 - 0.50	4.8	Light grey loamy gravel with rubble and stones
70236	WS10	ES1	0.50 - 0.60	5.6	Light grey clay with concrete and stones
70237	WS10	ES2	0.80 - 1.00	8.1	Brown sandy clay with concrete and stones
70238	WS11	ES1	0.50 - 0.60	15	Light brown sandy clay
70239	WS12	WS1	0.40 - 0.50	10.8	Brown sandy clay with concrete and stones
70240	WS13	ES1	0.40 - 0.50	11.9	Brown clayey loam with stones and brick
70241	WS14	ES1	0.70 - 0.80	9.5	Black clayey gravel with rubble and concrete
70242	WS14	ES2	1.00 - 1.10	17.5	Light grey clay with stones
70243	WS15	ES1	0.40 - 0.50	8.3	Light grey clayey gravel with chalk and stones
70244	WS16	ES1	0.30 - 0.40	10.7	Brown clayey loam with stones and vegetation
70245	WS16	ES2	0.80 - 0.90	8	Black sandy gravel with rubble

Insufficient sample I/S
Unsuitable Sample U/S

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 851105

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 13-14777
Opus International
Site Reference: Hayes
Project / Job Ref: J-M0167.00
Order No: MK 04529
Reporting Date: 04/06/2013

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
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	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	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E021
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
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	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by turbidimeter	E020
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E023
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E011
Soil	D	Loss on Ignition @ 450°C	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	D	Phosphorus	Determination of phosphorus by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	AR	Sulphide	Determination of sulphide by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia, potassium iodide/iodate followed by ICP-OES	E002
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	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E011
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E009
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
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	E009
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E010
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E009
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	VPH (C6 - C10)	Determination of hydrocarbons C6-C10 by headspace GC-MS	E001
Soil	AR	EPH TEXAS	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	TPH CWG	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	TPH LQM	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	EPH (with florisil cleanup)	Determination of acetone/hexane extractable hydrocarbons with florisil cleanup step by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001

Key

D Dried
AR As Received

2343

AMS Management LLP (South)
Unit 1
9, Cannon Lane
Tonbridge
Kent TN9 1PP
Tel: 01732 368359
Email: pete.everard@ams-holdings.com

CERTIFICATE OF ANALYSIS

Report Number: TN53770v0 **Other Ref:** J-M0167.00-14824 **Report Date:** 30/05/2013

Company: QTS Environmental Ltd
Unit 1 Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent ME17 2JN

Site: Hayes

AMS Sample Ref	Client Sample No	Sample Location	Material Type	Asbestos Type	Content
AMS/PE/240310	ASB	70490	Insulation board	Asbestos not detected	None

..... END .....

Key to fibre content: Trace = Trace asbestos identified (1 or 2 fibres present) Positive = Asbestos identified (more than 2 fibres present).

Sampled: Externally Number of samples: 1 Date samples received: 30/05/2013 Name of analyst: Pete Everard Date of analysis: 30/05/2013

Quantitive Fibre Content is not covered by our UKAS accreditation and is not reported. However guidance on the percentages of asbestos used in various products is available in HSG 264. Material types are visually assessed and are outside the scope of UKAS accreditation. The analysis has been performed using the AMS 'In House' method of transmitted/polarised light microscopy and centre stop dispersion staining, based on the HSG 248. AMS do not accept responsibility for any descrepancy or inaccuracy arising from samples labelled or collected by clients or third parties. This certificate of analysis shall not be reproduced except in full, without written approval of the laboratory.

For and on behalf of AMS Management (GB) LLP

Pete Everard
Lab Manager

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APPENDIX E

Geotechnical Test Results

Project Name:	Hayes			**Samples Received:**	24/05/2013
				Project Started:	29/05/2013
Client:	Opus International Consultants (UK) Ltd			**Testing Started:**	03/06/2013
Project No:	J-M0167.00	**Our job/report no:**	14677	**Date Reported:**	04/06/2013

K4 SOILS

Borehole No:	Sample No:	Depth (m)	Description	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425 mm (%)	Remarks
TP3	D3	1.00	Pale grey and orange slightly gravelly CLAY with sandy clay pockets (gravel is fine and sub-angular)	24	52	19	33	80	
TP5	D2	1.00	Brown and orangey brown slightly sandy slightly gravelly CLAY with occasional roots (gravel is fm and sub-angular)	23	52	20	32	90	
TP8	D3	0.80	Brown, orangey brown and grey slightly sandy slightly gravelly CLAY (gravel is fm and sub-angular)	27	60	22	38	86	
WS9	D1	0.50 - 0.90	Brown, grey and occasional orange gravelly CLAY with occasional sandy clay pockets, roots and rootlets (gravel is fmc and sub-angular)	23	57	22	35	54	
WS14	D2	1.50 - 1.90	Brown, pale grey and occasional orange gravelly CLAY with sandy clay pockets (gravel is fmc and angular to rounded)	28	67	22	45	42	

UKAS TESTING 2519

Summary of Test Results

BS 1377 : Part 2 : Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method.
BS 1377 : Part 2 : Clause 5 : 1990 Determination of the plastic limit and plasticity index.
BS 1377 : Part 2 : Clause 3.2 : 1990 Determination of the moisture content by the oven-drying method.

Checked and Approved
Initials: K.P
Date: 04/06/2013

Opus International Consultants (UK) Ltd
1 South House
Bond Avenue
Milton Keynes
MK1 1SW
United Kingdom

t: +44 1908373383
w: www.opusinternational.co.uk

Registered in England & Wales,
Company Reg. No: 2847568
Reg Office: Willow House, Brotherswood Court
Great Park Road, Bristol, BS32 4QW