soils LIMITED

Validation Report

at
272-276 Bath Road, Heathrow, Middlesex UB3 5BX

for
Acre Heathrow Ltd

Reference: 14151/VR
July 2016

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This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

AGS Association of Geotechnical & Geoenvironmental Specialists
Quality Systems Certifications Ltd ISO 9001 : 2015 REGISTERED FIRM
Quality Systems Certifications Ltd ISO 18001 : 2007 REGISTERED FIRM
BGA CORPORATE MEMBER 2016 www.britishgeotech.org.uk

Executive Summary in Chronological Order, August 2014 – July 2016

1. The Phase II Ground Intrusive Report undertaken by Soils Limited (Report ref: J14151/GIR, August 2014) established that that **there was a risk** to the human health receptors of construction workers, future maintenance workers and end users due to the presence of zootoxin lead in excess of its relevant LQM-CIEH Atkins AtRisk SSV Guideline Value.

   The asbestos screening and identification testing also revealed "***amosite and chrysotile – loose aggregates and chrysotile – loose aggregates" containing material in two samples of the Made Ground, WS2/0.20m and WS3/0.40m respectively***".

   The relevant locations plan and results are presented on Figure 1.1 and Appendix A respectively.

Figure 1.1 – August 2014

2. Following an email correspondence with the Environmental Health Officer (EHO) of London Borough of Hillingdon, it was agreed that additional soil sampling from the formation level (~0.3m-0.4m bgl) following site clearance and demolition was to be undertaken in April 2016 only within areas of proposed communal soft landscaping in order to conclude whether remedial measures would be required.

   The soil chemical results established that **none** of the concentrations of determinants were in excess of their relevant Soil Guideline Values (SGV), Category 4 Screening Levels (C4SL's) Atkins ATRISKsoil SSV Guideline Values for Lead and General Assessment Criteria (GAC) in the soil samples tested for the **Residential without plant-uptake** end-use screening values. No asbestos containing material was noted in any of the soil samples tested. **Therefore, it was concluded that there was no requirement for any remedial actions within the areas of proposed communal soft landscaping**.

   The relevant locations plan and results are presented on Figure 1.2 and Appendix B respectively.

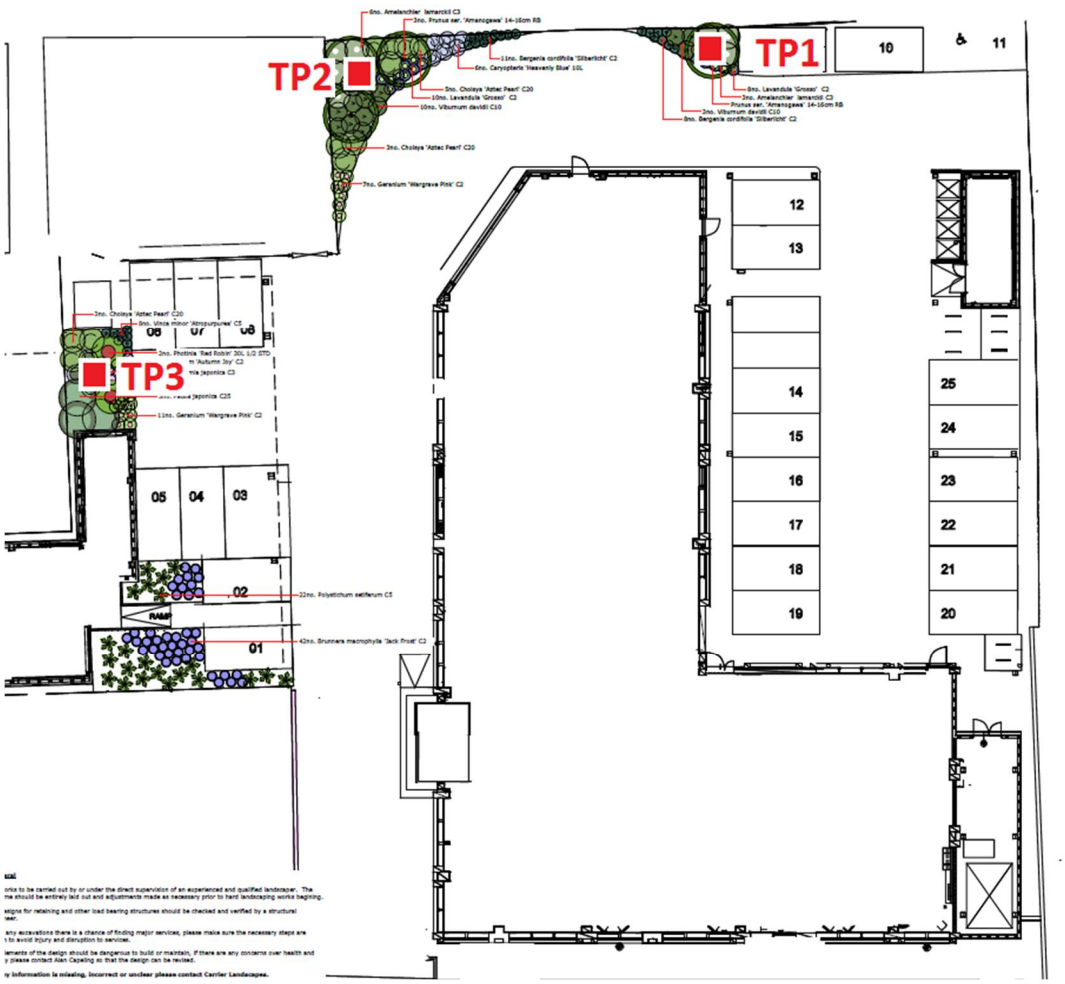

Figure 1.2 – April 2016

3. Soils Limited visited the site on 10th May 2016 in order to undertake soil sampling in the form of shallow hand dug trial pits (TPS1-TPS3) from the finished areas of communal soft landscaping, in order to establish that the Topsoil introduced was fit for purpose.

   Asbestos Containing Material (ACM) was detected within a soil sample from TPS2 at 0.16m bgl. The ACM was determined to comprise asbestos fibres (amosite). The results however showed that **none** of the concentrations of the other determinants were in excess of their relevant Soil Guideline Values (SGV), Category 4 Screening Levels (C4SL's) Atkins ATRISKsoil SSV Guideline Values for Lead and General Assessment Criteria (GAC) for the **Residential without plant-uptake** end-use screening values in the remaining Topsoil samples tested (TPS1 and TPS3). The remaining samples tested (TPS1 and TPS3) showed **no indication of any asbestos containing material**.

   It was therefore considered that the Topsoil material from the **TPS2 area was not suitable for the proposed use**. It was thus recommended that the Topsoil material was removed to a depth of ~0.4m bgl and new Topsoil material was introduced and re-tested. **The remaining communal soft landscaping areas of TPS1 and TPS3 were considered to be suitable for the proposed use thus there was no requirement for additional validation works on those areas.**

   The relevant locations plan and results are presented on Figure 1.3 and Appendix C respectively.

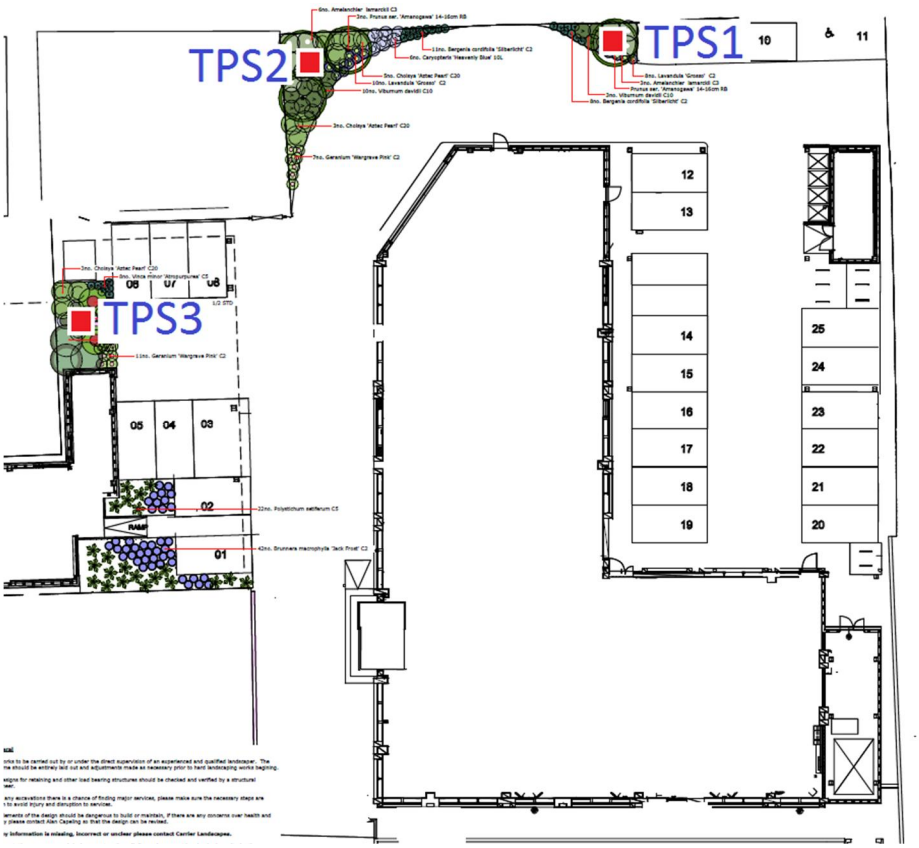

Figure 1.3 – 10th May 2016

4. Soils Limited re-visited the site on 31st May 2016 in order to undertake soil sampling in the form of shallow hand dug trial pits (TPSA-TPSC) from the finished areas of communal soft landscaping around the formerly impacted location (TPS2), in order to establish that the Topsoil introduced was fit for purpose.

   The results showed that **none** of the concentrations of determinants were in excess of their relevant Soil Guideline Values (SGV), Category 4 Screening Levels (C4SL's) Atkins ATRISKsoil SSV Guideline Values for Lead and General Assessment Criteria (GAC) for the **Residential without plant-uptake** end-use screening values in the Topsoil samples tested.

   The relevant locations plan and results are presented on Figure 1.4 and Appendix D respectively.

   Soils Limited can confirm that the Topsoil imported on site within areas of communal soft landscaping was suitable for the proposed land-use.

Figure 1.4 – 31st May 2016

General

This document relies on the results and should be read in conjunction with the:

- Phase I Desk Study (Report ref: 13711/DS, September 2013);
- Phase II Ground Investigation Report (Report ref: 14151/GIR, August 2014).

The redevelopment at 272-276 Bath Road comprised the construction of a four storey building, used as a hotel with 100 rooms and the incorporation of car parking and limited communal soft landscaping areas such as planters. In compiling this report reliance was placed on drawing number *1505CAR-HEA-01, Revision 1 by Carrier Landscapes Ltd dated 14/09/15* and supplied by the client.

A site location plan showing areas of communal soft landscaping is given on Figure 1.

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Section 1 Summary of Phase I - Desk Study

1.1 Conceptual Site Model Phase I - Desk Study

The Environment Agency Vulnerability Maps showed that both bedrock and superficial geology had an unproductive strata designation, however the Lynch Hill Gravel member is located beneath the Langley Silt and has principle aquifer designation.

Examination of the Environment Agency records showed that the site did not fall within a radius of 1000m of a Groundwater Source Protection Zone as classified in the Policy and Practice for the Protection of Groundwater.

Groundwater was anticipated to flow towards the south in line with wider topography.

The Envirocheck data sheet showed that no radon protection measures were required.

In order for any part of this conceptual model to be realised a source, pathway and receptor link must be in place and unbroken.

Each likely scenario, whereby source pathway and receptor could become linked, was considered and summarised in Table 1.1.

Table 1.1 Conceptual Site Model

Potential Sources	Potential Migration Pathway	Potential Absorption Pathway	Potential Receptor
ONSITE Made Ground (from historical redevelopment) I	Via anthropogenic pathways such as service trenches Via porous ground or anthropogenic pathways (services), accumulating in new buildings Via Groudwater	Ingestion of soil Dermal contact Inhalation of dust Inhalation of vapour Consumption of home grown vegetables and attached soil Location of service supply pipes in contaminated soils Migration via Groundwater	Construction workers (particularly during foundation construction) Service and Maintenance Operatives, especially in confined spaces Site Occupiers/Buildings Site Neighbours and the wider public Building materials Groundwater

Potential Sources	**Potential Migration Pathway**	**Potential Absorption Pathway**	**Potential Receptor**
OFF SITE Airport Petrol Station Garage	Via anthropogenic pathways such as service trenches Via porous ground or anthropogenic pathways (services), accumulating in new buildings Via Groudwater	Ingestion of soil Dermal contact Inhalation of dust Inhalation of vapour Consumption of home grown vegetables and attached soil Location of service supply pipes in contaminated soils Migration via Groundwater	Construction workers (particularly during foundation construction) Service and Maintenance Operatives, especially in confined spaces Site Occupiers/Buildings Site Neighbours and the wider public Building materials Groundwater

Section 2 Summary of Phase II - Intrusive Investigation

2.1 Conceptual Site Model

The Phase II intrusive investigation established the existence of Made Ground that was found from surface and comprised block paving or tarmac (0.02-0.15 metre in thickness) over sharp sand/limestone over dark grey brown sandy gravelly clay with brick, ask and clinker pockets.

Made Ground was proved to depths ranging between 0.40 metre bgl in WS1 and 0.75 metre bgl in WS2.

Therefore, the Conceptual Site Model presented in the Phase I Desk Study undertaken on the above site by Soils Limited (Report ref: 13806/DS, September 2013) **did not require revision.**

2.1.1 Soil

Soil samples at various depths were taken from the logged arisings recovered from the trial holes and placed in individual clean sampling containers to determine whether the soils had been impacted in order to assess the likelihood of human health being affected.

2.1.2 Groundwater

As discussed in the Phase I Desk Study, the Environment Agency Groundwater Vulnerability Maps showed the geological class of the superficial deposits as principle aquifer designation (associated with the Lynch Hill Gravel Member).

Examination of the Environment Agency records showed that the site did not fall within a radius of 1000m of a Groundwater Source Protection Zone as classified in the Policy and Practice for the Protection of Groundwater.

Groundwater was considered a sensitive receptor, nonetheless no groundwater was recorded during drilling or groundwater monitoring that would allow groundwater sampling and chemical laboratory testing.

However, leachate chemical laboratory testing was undertaken on the soil sample of the Made Ground, where the highest concentrations of contaminants (lead) were noted (WS3/0.40m), to assess the likelihood of groundwater being impacted.

2.2 Soil Sampling

A non-targeted sampling strategy is appropriate when there is:

- No adequate information available regarding the likely locations of contamination;
- No sensitive areas where there is a need for a high degree of confidence.

A targeted sampling strategy is appropriate when there is:

- Adequate information available regarding the likely locations of contamination;
- Sensitive areas where there is a need for a high degree of confidence.

A non-targeted sampling strategy was generally adopted with sampling locations given by the client and restricted to where access could be gained and no services were identified.

The soil sampling depths reflected both receptor and exposure scenarios of concern for groundwater and human health receptor, this being end users, groundwater, ground workers and future maintenance workers and are presented in Table 2.1.

Table 2.1 Sampling Depths

Depths	Potential Pathways and Receptors
0.1m-1.50	Direct ingestion, dermal contact and dust inhalation. Protection of site operatives, end users and maintenance workers e.g. Landscape Gardeners. Groundwater assessment – Leachate

The driver for the determination of the analysis suite was the information obtained from Conceptual Site Model presented in the Phase I Desk Study undertaken on the above site by Soils Limited (Report ref: 13806/DS, September 2013) and the Phase II intrusive investigation, as incorporated within the Conceptual Site Model framework.

The analysis suite is presented in Table 2.2.

Table 2.2 Determination of Contaminants of Concern

Substance	WS1:0.10	WS2:0.20	WS3:0.40	WS1:1.00	WS3:1.50
Asbestos Screen	✓	✓	✓	✓	✓
Total Phenols	✓	✓	✓	✓	✓
Total Cyanide	✓	✓	✓	✓	✓
Organic Matter	✓	✓	✓	✓	✓
pH	✓	✓	✓	✓	✓
Metals	✓	✓	✓	✓	✓
Metalloids	✓	✓	✓	✓	✓
Organics	✓	✓	✓	✓	✓
PAHs	✓	✓	✓	✓	✓
Speciated TPH	✓	✓	✓	✓	✓
BTEX	✓	✓	✓	✓	✓

Notes: ***metals***: Cd, Cr, Pb, Hg, Ni, Se, CN, S, Cu, Zn, Bo, V. ***metalloids***: As. ***PAH's***: USEPA 16 speciated PAH with assessment on benzo(a)pyrene, naphthalene, fluorene, dibenzo(a,h)Anthracene. ***BTEX***: Benzene, Toluene, Ethylebenzene, Xylene. **Speciated TPH** – Aromatic/Aliphatic

The results of the contamination testing are presented in Appendix A.

2.3 Soil Leachate Analyses

Leachate chemical laboratory testing was undertaken on the soil sample of the Made Ground, where the highest concentrations of contaminants (lead) were noted (WS3/0.40m), to assess the likelihood of groundwater being impacted.

The sample was subjected to leachate analyses for metals, metalloid and speciated PAH. For Tier 1 Qualitative risk assessment the results were compared with EQS's taken as those for the UK Drinking Water Standards (DWS) and the EA Standards for Protection of Aquatic Life (Freshwater). This represented a high degree of conservatism given the environmental setting of the site.

The results of the contamination testing are presented in Appendix A.

2.4 Representative Contamination Concentration - Soil

The redevelopment at 272-276 Bath Road comprised the construction of a four storey building, used as a hotel with 100 rooms and the incorporation of car parking and limited communal soft landscaping areas such as planters. In compiling this report reliance was placed on drawing number 1505CAR-HEA-01, Revision 1 by Carrier Landscapes Ltd dated 14/09/15 and supplied by the client.

The results of the comparison of the representative contaminants concentration for human health receptor to the Soil Guideline Values (SGV) and General Assessment Criteria (GAC) are presented in Table 2.5.

The SGV and GAC are assessed against the "Residential" land-use scenario, which was available at the time of the reporting (August 2014) that was considered a **conservative** land-use scenario, given the type of the proposed redevelopment.

The assessment for lead was undertaken based on the Atkins AtRisk SSV Guideline Value for the "Residential without plant uptake" land-use scenario.

Table 2.5 Summary of Chemical Analysis of Soil Samples Exceedance

Substance	Sample location where SGV, SSV or GAC adopted were exceeded for the 'Residential' land-use scenario
Lead	WS3/0.40m
Fibrous screening	WS2/0.20m, WS3/0.40m

Notes: ***metals***: Cd, Cr, Pb, Hg, Ni, Se, CN, S, Cu, Zn, Bo, V. ***metalloids***: As. ***PAH's***: USEPA 16 speciated PAH with assessment on benzo(a)pyrene, naphthalene, fluorene, dibenzo(a,h)Anthracene. ***BTEX***: Benzene, Toluene, Ethylebenzene, Xylene. **Speciated TPH** – Aromatic/Aliphatic

To assess the potential toxicity to the human health receptor from the concentrations of organic compounds tested for such as naphthalene, fluorene, dibenzo(a,h)anthracene, TPH and BTEX, Soil Organic Matter (SOM) tests were undertaken on the samples submitted for chemical testing, which revealed SOM values of between 1.1% and 3.6%.

For each soil sample tested, the Soil Organic Matter recorded was used to derive the appropriate guideline value for organic determinants.

2.5 Representative Contamination Concentration - Leachate

The results of the leachate testing are presented in Table 2.7.

For Tier 1 risk assessment the results were compared against Environmental Quality Standards (EQS's) taken as UK Drinking Water Standards (DWS), EA Standard for Protection of Aquatic Life - Freshwater (SPAL) and World Health Organisation Guidelines for Drinking Water Quality, 1984 (WHO). The UK Drinking Water Standards are the most appropriate published standards applicable to UK control of potable water sources.

Table 2.7 Summary of Chemical Analysis for Leachate Sample (WS3/0.40m)

Substance	Units	EQS Source	EQS Concentration	Sample where EQS Level was exceeded
Arsenic	µg/l	SPAL	50	None
Benzene	µg/l	DWS	1	None
Boron	µg/l	DWS	1000	None
Cadmium	µg/l	SPAL/DWS	5	None
Chromium	µg/l	DWS	50	None
Copper	µg/l	DWS	2000	None
Nickel	µg/l	DWS	20	None
Lead	µg/l	DWS	10	None
Mercury	µg/l	DWS	1	None
Selenium	µg/l	DWS	10	None
Vanadium	µg/l	DWS	250000	None
Zinc	µg/l	DWS	5000	None
Sulphate	mg/l	SPAL	400	None
Sulphide	µg/l	SPAL	0.25	None
Benzo (a) pyrene	µg/l	DWS/FW	0.01	None

Note: DWS = UK Drinking Water Standards. **SPAL** = EA Standard for Protection of Aquatic Life (Freshwater). **FW** = Freshwater standard. **EQS** = Environmental Quality Standards. **WHO** = World Health Organisation

[1] The specified compounds are benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene and indeno[1,2,3- c,d]pyrene.

2.6 Tier 1 Quantitative Risk Assessment

A quantitive risk assessment for each of the vulnerable receptors is presented within this section of the report.

2.6.1 Soil

Tier 1 Quantitative risk assessment established that **there was a risk** to the human health receptors of construction workers, future maintenance workers and end users due to the presence of **zootoxin lead** in excess of its relevant LQM-CIEH Atkins AtRisk SSV Guideline Value.

The asbestos screening and identification testing also revealed "***amosite and chrysotile – loose aggregates and chrysotile – loose aggregates" containing material in two samples of the Made Ground, WS2/0.20m and WS3/0.40m respectively***".

Groundwater: Tier 1 Quantitative risk assessment established that **there was no risk** to the **groundwater receptor** as there were no concentrations of determinants in excess of their relevant Environmental Quality Standards (EQS) in the leachate analysis results of the soil sample of the Made Ground (WS3/0.40m) tested.

The results of the contamination testing are presented in Appendix A.

Section 3 Additional Works in April 2016

3.1 General

Following an email correspondence with the Environmental Health Officer (EHO) of London Borough of Hillingdon, it was agreed that additional soil sampling from the formation level (~0.3m-0.4m bgl) following site clearance and demolition was undertaken only within areas of proposed communal soft landscaping in order to conclude whether remedial measures would be required.

On the 28th April 2016, Soils Limited re-visited the site and recovered soil samples (3) from trial pits that were hand excavated from the area of proposed communal soft landscaping, at a depth of ~0.30metre bgl, as agreed with the EHO of the London Borough of Hillingdon.

The driver for the determination of the analysis suite was agreed with the EHO of the London Borough of Hillingdon and is presented in Table 4.1

Table 4.1 Determination of Contaminants of Concern

Substance	TP1:0.30	TP2:0.30	TP3:0.30
Asbestos Screen	✓	✓	✓
Total Phenols	✓	✓	✓
Total Cyanide	✓	✓	✓
Organic Matter	✓	✓	✓
pH	✓	✓	✓
Metals	✓	✓	✓
Metalloids	✓	✓	✓
Organics	✓	✓	✓
PAHs	✓	✓	✓
Speciated TPH	✓	✓	✓
BTEX	✓	✓	✓

Notes: metals: Cd, Cr, Pb, Hg, Ni, Se, CN, S, Cu, Zn, Bo, V. metalloids: As. PAH's: USEPA 16 speciated PAH with assessment on benzo(a)pyrene, naphthalene, fluorene, dibenzo(a,h)Anthracene. BTEX: Benzene, Toluene, Ethylebenzene, Xylene. Speciated TPH – Aromatic/Aliphatic

The results of the comparison of the representative contaminants concentration for human health receptor to the Soil Guideline Values (SGV), General Assessment Criteria (GAC) and SSV (Atkins AtRisk SSV Guideline) are presented in the Table 4.2 and are assessed against the ***"Residential without plant uptake"*** land-use scenario as this was considered the most appropriate land-use scenario given the type of the proposed redevelopment:

Table 4.2 Summary of Chemical Analysis of Soil Samples

Substance	Sample location where SGV, SSV or GAC adopted were exceeded for the "Residential without plant uptake" land-use scenario
Arsenic	None
Beryllium	None
w/s Boron	None
Cadmium	None
Chromium	None
Copper	None
Lead	None
Mercury (inorganic)	None
Nickel	None
Selenium	None
Vanadium	None
Zinc	None
Total Cyanide	None
PAHs	None
Speciated TPH	None
BTEX	None
Asbestos Screen	None

To assess the potential toxicity to the human health receptor from the concentrations of organic compounds tested for such as naphthalene, fluorene, dibenzo(a,h)anthracene, TPH, BTEX, Soil Organic Matter (SOM) tests were undertaken on the samples submitted for chemical testing, which revealed SOM values of between 1.4% and 3.4%. For each soil sample tested, the Soil Organic Matter recorded was used to derive the appropriate guideline value for organic determinants.

The soil chemical results established that **none** of the concentrations of determinants were in excess of their relevant Soil Guideline Values (SGV), Category 4 Screening Levels (C4SL's) Atkins ATRISKsoil SSV Guideline Values for Lead and General Assessment Criteria (GAC) in the soil samples tested for the **Residential without plant-uptake** end-use screening values. No asbestos containing material was noted in any of the soil samples tested. **Therefore, it was concluded that there was no requirement for any remedial actions within the areas of proposed communal soft landscaping**.

The relevant locations plan and results are presented on Figure 1.2 and Appendix B respectively.

Section 4 Validation Works in May 2016 (a)

4.1 General

Soils Limited visited the site on 10th May 2016 in order to undertake soil sampling in the form of shallow trial pits (TPS1-TPS3) from the finished areas of communal soft landscaping, in order to establish that the Topsoil introduced was fit for purpose.

4.2 Topsoil Requirements

Any imported Topsoil used on this site was as defined in the British Standard BS3882:2015 Specification for topsoil. In addition, any soil, which was imported onto the site, had to undergo chemical analysis to permit classification prior to its importation and placement in order to ascertain its status with specific regard to contamination, i.e. to prove that it was suitable for the purpose for which it is intended.

Soils Limited visited the site on 10th May 2016 in order to undertake soil sampling in the form of shallow trial pits (TPS1-TPS3) from the finished areas of communal soft landscaping, in order to establish that the Topsoil introduced was fit for purpose.

The samples were analysed for pH, TOC, asbestos, metals, polyaromatic hydrocarbons, BTEX and Speciated Total Petroleum Hydrocarbons.

Asbestos Containing Material (ACM) was detected within a soil sample from TPS2 at 0.16m bgl. The ACM was determined to comprise asbestos fibres (amosite). The results however showed that **none** of the concentrations of determinants were in excess of their relevant Soil Guideline Values (SGV), Category 4 Screening Levels (C4SL's) Atkins ATRISKsoil SSV Guideline Values for Lead and General Assessment Criteria (GAC) for the **Residential without plant-uptake** end-use screening values in the remaining Topsoil samples tested (TPS1 and TPS3). The remaining samples tested (TPS1 and TPS3) showed **no indication of any asbestos containing material**.

It was therefore considered that the Topsoil material from the **TPS2 area was not suitable for the proposed use**. It was thus recommended that the Topsoil material was removed to a depth of ~0.4m bgl and new Topsoil material was introduced and re-tested. **The remaining communal soft landscaping areas of TPS1 and TPS3 were considered to be suitable for the proposed use thus there was no requirement for additional validation works on those areas.**

The relevant locations plan and results are presented on Figure 1.3 and Appendix C respectively.

The assessment criteria used to determine risks to human health are derived and explained within Appendix E.

Section 5 Validation Works in May 2016 (b)

5.1 General

Soils Limited re-visited the site on 31st May 2016 in order to undertake soil sampling in the form of shallow trial pits (TPSA-TPSC) from the finished areas of soft landscaping around the formerly impacted location (TPS2), in order to establish that the Topsoil introduced was fit for purpose.

5.2 Topsoil Requirements

Any imported Topsoil used on this site was as defined in the British Standard BS3882:2015 Specification for topsoil. In addition any soil, which was imported onto the site, had to undergo chemical analysis to permit classification prior to its importation and placement in order to ascertain its status with specific regard to contamination, i.e. to prove that it was suitable for the purpose for which it is intended.

Soils Limited visited the site on 31st May 2016 in order to undertake soil sampling in the form of shallow trial pits (TPSA-TPSC) from the finished areas of communal soft landscaping around the formerly impacted location (TPS2), in order to establish that the Topsoil introduced was fit for purpose.

The samples were analysed for pH, TOC, metals, polyaromatic hydrocarbons, BTEX and Speciated Total Petroleum Hydrocarbons.

The results showed that **none** of the concentrations of determinants were in excess of their relevant Soil Guideline Values (SGV), Category 4 Screening Levels (C4SL's) Atkins ATRISKsoil SSV Guideline Values for Lead and General Assessment Criteria (GAC) for the **Residential without plant-uptake** end-use screening values in the remaining Topsoil samples tested.

The relevant locations plan and results are presented on Figure 1.4 and Appendix D respectively.

Soils Limited can therefore confirm that the Topsoil material imported on site within areas of communal soft landscaping was suitable for the proposed land-use.

The assessment criteria used to determine risks to human health are derived and explained within Appendix E.

5.3 Photographs

Photographic evidence taken after before, during and after the validation works and the Topsoil introduction are presented in Appendix F.

5.4 Discovery Strategy

Soils Limited can confirm that the Discovery Strategy described in Section 8.7 of the Phase II Ground Intrusive Report undertaken by Soils Limited (Report ref: J14151/GIR, August 2014) has been closely followed.

More specifically, attention was drawn in order to ensure that any areas of contamination that were not identified during the course of the intrusive investigation i.e. underground storage tanks (UST's) not identified during the Desk Study and/or Ground Investigation were carefully recorded.

Groundworkers were instructed to report to the Site Manager any evidence for such contamination, this may comprise visual indicators, such as fibrous materials within the soil, discolouration, or odours and emission. Upon discovery advice was to be taken from a suitably qualified person before proceeding, such that appropriate remedial measures and health and safety protection may be applied.

Should a new source of contamination was suspected or identified then works would have to be suspended in the area of the site and the Local Authority be informed.

List of Appendices

Appendix A Chemical Laboratory Analysis (August 2014)

Appendix B Chemical Laboratory Analysis (April 2016)

Appendix C Topsoil Laboratory Analysis (10th May 2016)

Appendix D Topsoil Laboratory Analysis (31st May 2016)

Appendix E Assessment Criteria for Human Health

Appendix F Photographs

Figure number	Title
1	Proposed Communal Soft Landscaping Plan
Project	**Date**
272-276 Bath Road, Heathrow, Middlesex UB3 5BX	July 2016
Client	**Job Number**
Acre Heathrow Ltd	14151

Appendix A Chemical Laboratory Analysis (August 2014)

Nikos Sidiropoulos
Soils Ltd
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR

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

QTS Environmental Report No: 14-22845

Site Reference:	Bath Road
Project / Job Ref:	J14151
Order No:	None Supplied
Sample Receipt Date:	09/07/2014
Sample Scheduled Date:	09/07/2014
Report Issue Number:	1
Reporting Date:	15/07/2014

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 850410

4480

Soil Analysis Certificate						
QTS Environmental Report No: 14-22845	**Date Sampled**	30/06/14	30/06/14	30/06/14	30/06/14	30/06/14
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bath Road	**TP / BH No**	WS1	WS2	WS3	WS1	WS3
Project / Job Ref: J14151	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	0.10	0.20	0.40	1.00	1.50
Reporting Date: 15/07/2014	**QTSE Sample No**	110210	110211	110212	110213	110214

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Screen	N/a	N/a	**ISO17025**	Not Detected	Detected	Detected	Not Detected	Not Detected
Asbestos Matrix	Material Type	N/a	NONE		Loose fibres	Loose fibres		
Asbestos Type	PLM Result	N/a	**ISO17025**		Amosite & Chrysotile	Chrysotile		
pH	pH Units	N/a	**MCERTS**	8.1	8.1	7.5	7.4	7.3
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
W/S Sulphate as SO4 (2:1)	g/l	< 0.01	**MCERTS**	0.01	0.06	0.12	0.03	0.02
Sulphide	mg/kg	< 5	NONE	< 5	< 5	< 5	< 5	< 5
Organic Matter	%	< 0.1	NONE	1.2	2.1	3.6	1.1	1.5
Total Organic Carbon (TOC)	%	< 0.1	NONE	0.7	1.2	2.1	0.7	0.9
Arsenic (As)	mg/kg	< 2	**MCERTS**	6	6	11	6	5
Beryllium (Be)	mg/kg	< 0.5	NONE	< 0.5	< 0.5	1.2	0.8	1
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	2.1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.5	**MCERTS**	1	< 0.5	< 0.5	< 0.5	< 0.5
Chromium (Cr)	mg/kg	< 2	**MCERTS**	8	25	27	36	35
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	**MCERTS**	< 4	37	75	17	18
Lead (Pb)	mg/kg	< 3	**MCERTS**	16	195	513	22	16
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	**MCERTS**	4	16	26	24	39
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Vanadium (V)	mg/kg	< 2	NONE	10	26	40	55	53
Zinc (Zn)	mg/kg	< 3	**MCERTS**	66	162	288	60	63
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

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

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Piotr Lipski

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis [(S)]

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Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 14-22845	**Date Sampled**	30/06/14	30/06/14	30/06/14	30/06/14	30/06/14
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bath Road	**TP / BH No**	WS1	WS2	WS3	WS1	WS3
Project / Job Ref: J14151	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	0.10	0.20	0.40	1.00	1.50
Reporting Date: 15/07/2014	**QTSE Sample No**	110210	110211	110212	110213	110214

Determinand	**Unit**	**RL**	**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	< 0.1
Fluorene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	**MCERTS**	< 0.1	0.13	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	**MCERTS**	< 0.1	0.12	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	**MCERTS**	< 0.1	0.12	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
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**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	**MCERTS**	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

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

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Soil Analysis Certificate - TPH CWG Banded						
QTS Environmental Report No: 14-22845	**Date Sampled**	30/06/14	30/06/14	30/06/14	30/06/14	30/06/14
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bath Road	**TP / BH No**	WS1	WS2	WS3	WS1	WS3
Project / Job Ref: J14151	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	0.10	0.20	0.40	1.00	1.50
Reporting Date: 15/07/2014	**QTSE Sample No**	110210	110211	110212	110213	110214

Determinand	**Unit**	**RL**	**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	< 6	< 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	3	< 1	< 1	< 1
Aromatic >C21 - C35	mg/kg	< 6	NONE	< 6	< 6	< 6	< 6	< 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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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 14-22845	**Date Sampled**	30/06/14	30/06/14	30/06/14	30/06/14	30/06/14
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Bath Road	**TP / BH No**	WS1	WS2	WS3	WS1	WS3
Project / Job Ref: J14151	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	**Depth (m)**	0.10	0.20	0.40	1.00	1.50
Reporting Date: 15/07/2014	**QTSE Sample No**	110210	110211	110212	110213	110214

Determinand	Unit	RL	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

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

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Soil Analysis Certificate - Volatile Organic Compounds (VOC)							
QTS Environmental Report No: 14-22845	**Date Sampled**	30/06/14					
Soils Ltd	**Time Sampled**	None Supplied					
Site Reference: Bath Road	**TP / BH No**	WS3					
Project / Job Ref: J14151	**Additional Refs**	None Supplied					
Order No: None Supplied	**Depth (m)**	0.40					
Reporting Date: 15/07/2014	**QTSE Sample No**	110212					

Determinand	Unit	RL	Accreditation					
Dichlorodifluoromethane	ug/kg	< 5	MCERTS	< 5				
Vinyl Chloride	ug/kg	< 5	MCERTS	< 5				
Chloromethane	ug/kg	< 10	MCERTS	< 10				
Chloroethane	ug/kg	< 5	MCERTS	< 5				
Bromomethane	ug/kg	< 10	MCERTS	< 10				
Trichlorofluoromethane	ug/kg	< 5	MCERTS	< 5				
1,1-Dichloroethene	ug/kg	< 5	ISO17025	< 5				
MTBE	ug/kg	< 5	MCERTS	< 5				
trans-1,2-Dichloroethene	ug/kg	< 5	MCERTS	< 5				
1,1-Dichloroethane	ug/kg	< 5	MCERTS	< 5				
cis-1,2-Dichloroethene	ug/kg	< 5	MCERTS	< 5				
2,2-Dichloropropane	ug/kg	< 5	MCERTS	< 5				
Chloroform	ug/kg	< 5	MCERTS	< 5				
Bromochloromethane	ug/kg	< 5	MCERTS	< 5				
1,1,1-Trichloroethane	ug/kg	< 5	MCERTS	< 5				
1,1-Dichloropropene	ug/kg	< 10	MCERTS	< 10				
Carbon Tetrachloride	ug/kg	< 5	MCERTS	< 5				
1,2-Dichloroethane	ug/kg	< 5	MCERTS	< 5				
Benzene	ug/kg	< 2	MCERTS	< 2				
1,2-Dichloropropane	ug/kg	< 5	MCERTS	< 5				
Trichloroethene	ug/kg	< 5	MCERTS	< 5				
Bromodichloromethane	ug/kg	< 5	MCERTS	< 5				
Dibromomethane	ug/kg	< 5	MCERTS	< 5				
TAME	ug/kg	< 5	MCERTS	< 5				
cis-1,3-Dichloropropene	ug/kg	< 5	MCERTS	< 5				
Toluene	ug/kg	< 5	MCERTS	< 5				
trans-1,3-Dichloropropene	ug/kg	< 5	MCERTS	< 5				
1,1,2-Trichloroethane	ug/kg	< 10	MCERTS	< 10				
1,3-Dichloropropane	ug/kg	< 5	MCERTS	< 5				
Tetrachloroethene	ug/kg	< 5	MCERTS	< 5				
Dibromochloromethane	ug/kg	< 5	MCERTS	< 5				
1,2-Dibromoethane	ug/kg	< 5	MCERTS	< 5				
Chlorobenzene	ug/kg	< 5	MCERTS	< 5				
1,1,1,2-Tetrachloroethane	ug/kg	< 5	MCERTS	< 5				
Ethyl Benzene	ug/kg	< 10	MCERTS	< 10				
m,p-Xylene	ug/kg	< 10	MCERTS	< 10				
o-Xylene	ug/kg	< 10	MCERTS	< 10				
Styrene	ug/kg	< 5	MCERTS	< 5				
Bromoform	ug/kg	< 10	MCERTS	< 10				
Isopropylbenzene	ug/kg	< 5	MCERTS	< 5				
1,1,2,2-Tetrachloroethane	ug/kg	< 5	MCERTS	< 5				
1,2,3-Trichloropropane	ug/kg	< 5	MCERTS	< 5				
n-Propylbenzene	ug/kg	< 5	MCERTS	< 5				
Bromobenzene	ug/kg	< 5	MCERTS	< 5				
2-Chlorotoluene	ug/kg	< 5	MCERTS	< 5				
1,3,5-Trimethylbenzene	ug/kg	< 5	MCERTS	< 5				
4-Chlorotoluene	ug/kg	< 5	MCERTS	< 5				
tert-Butylbenzene	ug/kg	< 5	MCERTS	< 5				
1,2,4-Trimethylbenzene	ug/kg	< 5	MCERTS	< 5				
sec-Butylbenzene	ug/kg	< 5	MCERTS	< 5				
p-Isopropyltoluene	ug/kg	< 5	MCERTS	< 5				
1,3-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5				
1,4-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5				
n-Butylbenzene	ug/kg	< 5	MCERTS	< 5				
1,2-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5				
1,2-Dibromo-3-chloropropane	ug/kg	< 10	MCERTS	< 10				
Hexachlorobutadiene	ug/kg	< 5	MCERTS	< 5				

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

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Soil Analysis Certificate - Semi Volatile Organic Compounds (SVOC)							
QTS Environmental Report No: 14-22845	**Date Sampled**	30/06/14					
Soils Ltd	**Time Sampled**	None Supplied					
Site Reference: Bath Road	**TP / BH No**	WS3					
Project / Job Ref: J14151	**Additional Refs**	None Supplied					
Order No: None Supplied	**Depth (m)**	0.40					
Reporting Date: 15/07/2014	**QTSE Sample No**	110212					

Determinand	Unit	RL	Accreditation					
Phenol	mg/kg	< 0.1	NONE	< 0.1				
1,2,4-Trichlorobenzene	mg/kg	< 0.1	**ISO17025**	< 0.1				
2-Nitrophenol	mg/kg	< 0.1	NONE	< 0.1				
Nitrobenzene	mg/kg	< 0.1	**MCERTS**	< 0.1				
0-Cresol	mg/kg	< 0.1	NONE	< 0.1				
bis(2-chloroethoxy)methane	mg/kg	< 0.1	**MCERTS**	< 0.1				
bis(2-chloroethyl)ether	mg/kg	< 0.1	**MCERTS**	< 0.1				
2,4-Dichlorophenol	mg/kg	< 0.1	**MCERTS**	< 0.1				
2-Chlorophenol	mg/kg	< 0.1	**ISO17025**	< 0.1				
1,3-Dichlorobenzene	mg/kg	< 0.1	**ISO17025**	< 0.1				
1,4-Dichlorobenzene	mg/kg	< 0.1	**ISO17025**	< 0.1				
1,2-Dichlorobenzene	mg/kg	< 0.1	**ISO17025**	< 0.1				
2,4-Dimethylphenol	mg/kg	< 0.15	**ISO17025**	< 0.15				
Isophorone	mg/kg	< 0.1	NONE	< 0.1				
Hexachloroethane	mg/kg	< 0.1	**MCERTS**	< 0.1				
p-Cresol	mg/kg	< 0.15	**MCERTS**	< 0.15				
2,4,6-Trichlorophenol	mg/kg	< 0.1	**MCERTS**	< 0.1				
2,4,5-Trichlorophenol	mg/kg	< 0.1	**MCERTS**	< 0.1				
2-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1				
4-Chloro-3-methylphenol	mg/kg	< 0.1	NONE	< 0.1				
2-Methylnaphthalene	mg/kg	< 0.1	**MCERTS**	< 0.1				
Hexachlorocyclopentadiene	mg/kg	< 0.1	NONE	< 0.1				
Hexachlorobutadiene	mg/kg	< 0.1	**ISO17025**	< 0.1				
2,6-Dinitrotoluene	mg/kg	< 0.1	**MCERTS**	< 0.1				
Dimethyl phthalate	mg/kg	< 0.1	NONE	< 0.1				
2-Chloronaphthalene	mg/kg	< 0.1	**MCERTS**	< 0.1				
4-Chloroanaline	mg/kg	< 0.2	NONE	< 0.2				
4-Nitrophenol	mg/kg	< 0.1	NONE	< 0.1				
4-Chlorophenyl phenyl ether	mg/kg	< 0.1	**MCERTS**	< 0.1				
3-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1				
4-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1				
4-Bromophenyl phenyl ether	mg/kg	< 0.1	**MCERTS**	< 0.1				
Hexachlorobenzene	mg/kg	< 0.1	**MCERTS**	< 0.1				
2,4-Dinitrotoluene	mg/kg	< 0.1	**MCERTS**	< 0.1				
Diethyl phthalate	mg/kg	< 0.1	**MCERTS**	< 0.1				
Dibenzofuran	mg/kg	< 0.1	**MCERTS**	< 0.1				
Azobenzene	mg/kg	< 0.1	NONE	< 0.1				
Dibutyl phthalate	mg/kg	< 0.15	**ISO17025**	< 0.15				
Carbazole	mg/kg	< 0.1	**ISO17025**	< 0.1				
bis(2-ethylhexyl)phthalate	mg/kg	< 0.2	**MCERTS**	< 0.2				
Benzyl butyl phthalate	mg/kg	< 0.1	**MCERTS**	< 0.1				
Di-n-octyl phthalate	mg/kg	< 0.1	**MCERTS**	< 0.1				

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 14-22845	
Soils Ltd	
Site Reference: Bath Road	
Project / Job Ref: J14151	
Order No: None Supplied	
Reporting Date: 15/07/2014	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
110210	WS1	None Supplied	0.10	2.7	Beige gravelly sand with stones
110211	WS2	None Supplied	0.20	12.4	Light brown sand with rubble
110212	WS3	None Supplied	0.40	16.8	Brown loamy clay with stones
& 110213	WS1	None Supplied	1.00	17.1	Light brown clay
& 110214	WS3	None Supplied	1.50	16	Light brown clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
& samples received in inappropriate containers for hydrocarbon analysis

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 14-22845
Soils Ltd
Site Reference: Bath Road
Project / Job Ref: J14151
Order No: None Supplied
Reporting Date: 15/07/2014

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	Determination of acetone/hexane extractable hydrocarbons by GC-FID	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	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	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6 - C10)	Determination of hydrocarbons C6-C10 by headspace GC-MS	E001

D Dried
AR As Received

Nikos Sidiropoulos
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KT20 5SR

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QTS Environmental Report No: 14-23076

Site Reference:	Bath Road
Project / Job Ref:	J14151
Order No:	None Supplied
Sample Receipt Date:	09/07/2014
Sample Scheduled Date:	16/07/2014
Report Issue Number:	1
Reporting Date:	22/07/2014

Authorised by:

Russell Jarvis
Director
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Director
On behalf of QTS Environmental Ltd

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UKAS TESTING 4480

Leachate Analysis Certificate						
QTS Environmental Report No: 14-23076	**Date Sampled**	30/06/14				
Soils Ltd	**Time Sampled**	None Supplied				
Site Reference: Bath Road	**TP / BH No**	WS3				
Project / Job Ref: J14151	**Additional Refs**	None Supplied				
Order No: None Supplied	**Depth (m)**	0.40				
Reporting Date: 22/07/2014	**QTSE Sample No**	111201				

Determinand	**Unit**	**RL**	**Accreditation**					
pH	pH Units	N/a	**ISO17025**	7.2				
Total Cyanide	ug/l	< 5	NONE	< 5				
Sulphate as SO_4	mg/l	< 1	**ISO17025**	84				
Sulphide	mg/l	< 0.1	NONE	< 0.1				
Total Organic Carbon (TOC)	mg/l	< 0.1	NONE	14.2				
Arsenic	ug/l	< 10	NONE	< 10				
Beryllium	ug/l	< 1	NONE	< 1				
Boron	ug/l	< 50	NONE	258				
Cadmium	ug/l	< 0.5	NONE	< 0.5				
Chromium	ug/l	< 5	NONE	< 5				
Chromium (hexavalent)	ug/l	< 5	NONE	< 5				
Copper	ug/l	< 10	NONE	< 10				
Lead	ug/l	< 5	NONE	< 5				
Mercury	ug/l	< 0.05	NONE	< 0.05				
Nickel	ug/l	< 7	NONE	< 7				
Selenium	ug/l	< 5	NONE	< 5				
Vanadium	ug/l	< 5	NONE	< 5				
Zinc	ug/l	< 5	NONE	12				
Total Phenols	ug/l	< 0.5	NONE	< 0.5				

Subcontracted analysis (S)

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Leachate Analysis Certificate - Speciated PAH						
QTS Environmental Report No: 14-23076	**Date Sampled**	30/06/14				
Soils Ltd	**Time Sampled**	None Supplied				
Site Reference: Bath Road	**TP / BH No**	WS3				
Project / Job Ref: J14151	**Additional Refs**	None Supplied				
Order No: None Supplied	**Depth (m)**	0.40				
Reporting Date: 22/07/2014	**QTSE Sample No**	111201				

Determinand	**Unit**	**RL**	**Accreditation**					
Naphthalene	ug/l	< 0.01	NONE	< 0.01				
Acenaphthylene	ug/l	< 0.01	NONE	< 0.01				
Acenaphthene	ug/l	< 0.01	NONE	< 0.01				
Fluorene	ug/l	< 0.01	NONE	< 0.01				
Phenanthrene	ug/l	< 0.01	NONE	< 0.01				
Anthracene	ug/l	< 0.01	NONE	< 0.01				
Fluoranthene	ug/l	< 0.01	NONE	< 0.01				
Pyrene	ug/l	< 0.01	NONE	< 0.01				
Benzo(a)anthracene	ug/l	< 0.01	NONE	< 0.01				
Chrysene	ug/l	< 0.01	NONE	< 0.01				
Benzo(b)fluoranthene	ug/l	< 0.01	NONE	< 0.01				
Benzo(k)fluoranthene	ug/l	< 0.01	NONE	< 0.01				
Benzo(a)pyrene	ug/l	< 0.01	NONE	< 0.01				
Indeno(1,2,3-cd)pyrene	ug/l	< 0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	ug/l	< 0.01	NONE	< 0.01				
Benzo(ghi)perylene	ug/l	< 0.01	NONE	< 0.01				
Total EPA-16 PAHs	ug/l	< 0.01	NONE	< 0.01				

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UKAS TESTING
4480

Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 14-23076
Soils Ltd
Site Reference: Bath Road
Project / Job Ref: J14151
Order No: None Supplied
Reporting Date: 22/07/2014

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by c	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detec	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	EPH TEXAS	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethan	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID	E104
Water	F	TPH LQM	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6 - C10)	Determination of hydrocarbons C6-C10 by headspace GC-MS	E101

Key

F Filtered
UF Unfiltered

Appendix B Chemical Laboratory Analysis (April 2016)

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QTS Environmental Report No: 16-43630

Site Reference:	Bath Road
Project / Job Ref:	None Supplied
Order No:	None Supplied
Sample Receipt Date:	29/04/2016
Sample Scheduled Date:	29/04/2016
Report Issue Number:	1
Reporting Date:	04/05/2016

Authorised by:

Russell Jarvis
Associate Director of Client Services
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Associate Director of Laboratory
On behalf of QTS Environmental Ltd

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Soil Analysis Certificate						
QTS Environmental Report No: 16-43630	**Date Sampled**	28/04/16	28/04/16	28/04/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TP1	TP2	TP3		
Project / Job Ref: None Supplied	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.30	0.30	0.30		
Reporting Date: 04/05/2016	**QTSE Sample No**	204205	204206	204207		

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Screen	N/a	N/a	**ISO17025**	Not Detected	Not Detected	Not Detected		
pH	pH Units	N/a	**MCERTS**	7.8	7.7	7.8		
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	172	316	601		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.17	0.32	0.60		
Sulphide	mg/kg	< 5	NONE	< 5	< 5	< 5		
Organic Matter	%	< 0.1	**MCERTS**	3.4	1.4	1.9		
Total Organic Carbon (TOC)	%	< 0.1	**MCERTS**	2	0.8	1.1		
Antimony (Sb)	mg/kg	< 1	NONE	7.2	11.5	2.2		
Arsenic (As)	mg/kg	< 2	**MCERTS**	14	14	9		
Beryllium (Be)	mg/kg	< 0.5	NONE	0.7	1	0.5		
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1		
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	< 0.2	< 0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	**MCERTS**	22	28	17		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	**MCERTS**	59	35	12		
Lead (Pb)	mg/kg	< 3	**MCERTS**	281	190	45		
Mercury (Hg)	mg/kg	< 1	NONE	1.1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	**MCERTS**	16	25	10		
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3		
Vanadium (V)	mg/kg	< 2	NONE	37	44	30		
Zinc (Zn)	mg/kg	< 3	**MCERTS**	264	220	58		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2		

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

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Graham Revell

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis [(S)]

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Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 16-43630	**Date Sampled**	28/04/16	28/04/16	28/04/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TP1	TP2	TP3		
Project / Job Ref: None Supplied	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.30	0.30	0.30		
Reporting Date: 04/05/2016	**QTSE Sample No**	204205	204206	204207		

Determinand	**Unit**	**RL**	**Accreditation**					
Naphthalene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	**MCERTS**	0.25	< 0.1	< 0.1		
Anthracene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Fluoranthene	mg/kg	< 0.1	**MCERTS**	0.55	0.16	< 0.1		
Pyrene	mg/kg	< 0.1	**MCERTS**	0.47	0.15	< 0.1		
Benzo(a)anthracene	mg/kg	< 0.1	**MCERTS**	0.14	< 0.1	< 0.1		
Chrysene	mg/kg	< 0.1	**MCERTS**	0.30	0.11	< 0.1		
Benzo(b)fluoranthene	mg/kg	< 0.1	**MCERTS**	0.18	< 0.1	< 0.1		
Benzo(k)fluoranthene	mg/kg	< 0.1	**MCERTS**	0.13	< 0.1	< 0.1		
Benzo(a)pyrene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Dibenz(a,h)anthracene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Total EPA-16 PAHs	mg/kg	< 1.6	**MCERTS**	2	< 1.6	< 1.6		

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

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4480

Soil Analysis Certificate - TPH LQM Banded						
QTS Environmental Report No: 16-43630	**Date Sampled**	28/04/16	28/04/16	28/04/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TP1	TP2	TP3		
Project / Job Ref: None Supplied	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.30	0.30	0.30		
Reporting Date: 04/05/2016	**QTSE Sample No**	204205	204206	204207		

Determinand	**Unit**	**RL**	**Accreditation**					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
Aliphatic >C8 - C10	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aliphatic >C10 - C12	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aliphatic >C12 - C16	mg/kg	< 3	**MCERTS**	< 3	< 3	< 3		
Aliphatic >C16 - C35	mg/kg	< 10	**MCERTS**	< 10	< 10	< 10		
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10		
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30		
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
Aromatic >C8 - C10	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aromatic >C10 - C12	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aromatic >C12 - C16	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aromatic >C16 - C21	mg/kg	< 3	**MCERTS**	< 3	< 3	< 3		
Aromatic >C21 - C35	mg/kg	< 10	**MCERTS**	< 10	< 10	< 10		
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10		
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30		
Total >C5 - C44	mg/kg	< 60	NONE	< 60	< 60	< 60		

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

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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 16-43630	**Date Sampled**	28/04/16	28/04/16	28/04/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TP1	TP2	TP3		
Project / Job Ref: None Supplied	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.30	0.30	0.30		
Reporting Date: 04/05/2016	**QTSE Sample No**	204205	204206	204207		

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

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

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 16-43630	
Soils Ltd	
Site Reference: Bath Road	
Project / Job Ref: None Supplied	
Order No: None Supplied	
Reporting Date: 04/05/2016	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
204205	TP1	None Supplied	0.30	17.3	Brown clay with stones and vegetation
204206	TP2	None Supplied	0.30	14.2	Brown clay
204207	TP3	None Supplied	0.30	14.7	Brown clay with concrete and stones

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 16-43630
Soils Ltd
Site Reference: Bath Road
Project / Job Ref: None Supplied
Order No: None Supplied
Reporting Date: 04/05/2016

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

Appendix C Topsoil Laboratory Analysis (10th May 2016)

Nikos Sidiropoulos
Soils Ltd
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR

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russell.jarvis@qtsenvironmental.com

QTS Environmental Report No: 16-44101

Site Reference:	Bath Road
Project / Job Ref:	None Supplied
Order No:	None Supplied
Sample Receipt Date:	12/05/2016
Sample Scheduled Date:	12/05/2016
Report Issue Number:	1
Reporting Date:	18/05/2016

Authorised by:

Russell Jarvis
Associate Director of Client Services
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Associate Director of Laboratory
On behalf of QTS Environmental Ltd

QTS Environmental Ltd
Unit 1, Rose Lane Industrial Estate
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Lenham Heath
Maidstone
Kent ME17 2JN
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Soil Analysis Certificate						
QTS Environmental Report No: 16-44101	**Date Sampled**	10/05/16	10/05/16	10/05/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TPS1	TPS2	TPS3		
Project / Job Ref: None Supplied	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.15	0.16	0.20		
Reporting Date: 18/05/2016	**QTSE Sample No**	206253	206254	206255		

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Screen	N/a	N/a	**ISO17025**	Not Detected	Detected	Not Detected		
Sample Matrix	Material Type	N/a	NONE		Loose fibres			
Asbestos Type	PLM Result	N/a	**ISO17025**		Amosite			
pH	pH Units	N/a	**MCERTS**	7.2	7.3	7.4		
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	1680	1690	1510		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	1.68	1.69	1.50		
Sulphide	mg/kg	< 5	NONE	< 5	5	< 5		
Organic Matter	%	< 0.1	**MCERTS**	4.5	5	4.2		
Total Organic Carbon (TOC)	%	< 0.1	**MCERTS**	2.6	2.9	2.4		
Antimony (Sb)	mg/kg	< 1	NONE	3.8	6.5	4		
Arsenic (As)	mg/kg	< 2	**MCERTS**	11	10	13		
Beryllium (Be)	mg/kg	< 0.5	NONE	0.6	1	0.6		
W/S Boron	mg/kg	< 1	NONE	1.6	1	1.9		
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	< 0.2	< 0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	**MCERTS**	17	23	16		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	**MCERTS**	55	26	51		
Lead (Pb)	mg/kg	< 3	**MCERTS**	179	122	172		
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	**MCERTS**	12	10	11		
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3		
Vanadium (V)	mg/kg	< 2	NONE	30	37	27		
Zinc (Zn)	mg/kg	< 3	**MCERTS**	213	137	171		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2		

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

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Graham Revell

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 16-44101	**Date Sampled**	10/05/16	10/05/16	10/05/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TPS1	TPS2	TPS3		
Project / Job Ref: None Supplied	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.15	0.16	0.20		
Reporting Date: 18/05/2016	**QTSE Sample No**	206253	206254	206255		

Determinand	**Unit**	**RL**	**Accreditation**					
Naphthalene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	**MCERTS**	0.35	0.42	0.33		
Anthracene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Fluoranthene	mg/kg	< 0.1	**MCERTS**	0.79	0.93	0.88		
Pyrene	mg/kg	< 0.1	**MCERTS**	0.66	0.75	0.75		
Benzo(a)anthracene	mg/kg	< 0.1	**MCERTS**	0.38	0.41	0.46		
Chrysene	mg/kg	< 0.1	**MCERTS**	0.38	0.40	0.45		
Benzo(b)fluoranthene	mg/kg	< 0.1	**MCERTS**	0.60	0.69	0.86		
Benzo(k)fluoranthene	mg/kg	< 0.1	**MCERTS**	0.17	0.20	0.21		
Benzo(a)pyrene	mg/kg	< 0.1	**MCERTS**	0.30	0.40	0.46		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	**MCERTS**	0.22	0.27	0.33		
Dibenz(a,h)anthracene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	**MCERTS**	0.16	0.20	0.25		
Total EPA-16 PAHs	mg/kg	< 1.6	**MCERTS**	4	4.7	5		

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

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4480

Soil Analysis Certificate - TPH LQM Banded						
QTS Environmental Report No: 16-44101	**Date Sampled**	10/05/16	10/05/16	10/05/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TPS1	TPS2	TPS3		
Project / Job Ref: None Supplied	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.15	0.16	0.20		
Reporting Date: 18/05/2016	**QTSE Sample No**	206253	206254	206255		

Determinand	**Unit**	**RL**	**Accreditation**					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
Aliphatic >C8 - C10	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aliphatic >C10 - C12	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aliphatic >C12 - C16	mg/kg	< 3	**MCERTS**	< 3	< 3	< 3		
Aliphatic >C16 - C35	mg/kg	< 10	**MCERTS**	13	87	19		
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10		
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30	87	< 30		
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
Aromatic >C8 - C10	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aromatic >C10 - C12	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aromatic >C12 - C16	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aromatic >C16 - C21	mg/kg	< 3	**MCERTS**	5	6	3		
Aromatic >C21 - C35	mg/kg	< 10	**MCERTS**	< 10	19	16		
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10		
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30		
Total >C5 - C44	mg/kg	< 60	NONE	< 60	112	< 60		

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

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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 16-44101	**Date Sampled**	10/05/16	10/05/16	10/05/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TPS1	TPS2	TPS3		
Project / Job Ref: None Supplied	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.15	0.16	0.20		
Reporting Date: 18/05/2016	**QTSE Sample No**	206253	206254	206255		

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

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

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 16-44101	
Soils Ltd	
Site Reference: Bath Road	
Project / Job Ref: None Supplied	
Order No: None Supplied	
Reporting Date: 18/05/2016	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
206253	TPS1	None Supplied	0.15	14	Brown clay with vegetation
206254	TPS2	None Supplied	0.16	11.5	Brown clay with vegetation
206255	TPS3	None Supplied	0.20	17.8	Brown clay with vegetation

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 16-44101
Soils Ltd
Site Reference: Bath Road
Project / Job Ref: None Supplied
Order No: None Supplied
Reporting Date: 18/05/2016

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

Appendix D Topsoil Laboratory Analysis (31st May 2016)

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QTS Environmental Report No: 16-44966

Site Reference:	Bath Road
Project / Job Ref:	14151
Order No:	None Supplied
Sample Receipt Date:	02/06/2016
Sample Scheduled Date:	02/06/2016
Report Issue Number:	1
Reporting Date:	07/06/2016

Authorised by:

Russell Jarvis
Associate Director of Client Services
On behalf of QTS Environmental Ltd

Authorised by:

Kevin Old
Associate Director of Laboratory
On behalf of QTS Environmental Ltd

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4480

Soil Analysis Certificate						
QTS Environmental Report No: 16-44966	**Date Sampled**	10/05/16	10/05/16	10/05/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TPSA	TPSB	TPSC		
Project / Job Ref: 14151	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.25	0.25	0.25		
Reporting Date: 07/06/2016	**QTSE Sample No**	209919	209920	209921		

Determinand	**Unit**	**RL**	**Accreditation**					
Asbestos Screen	N/a	N/a	**ISO17025**	Not Detected	Not Detected	Not Detected		
pH	pH Units	N/a	**MCERTS**	7.3	7.4	7.3		
Total Cyanide	mg/kg	< 2	NONE	< 2	< 2	< 2		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	**MCERTS**	139	141	138		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	**MCERTS**	0.14	0.14	0.14		
Sulphide	mg/kg	< 5	NONE	< 5	< 5	< 5		
Organic Matter	%	< 0.1	**MCERTS**	2.5	1.9	2.4		
Total Organic Carbon (TOC)	%	< 0.1	**MCERTS**	1.4	1.1	1.4		
Antimony (Sb)	mg/kg	< 1	NONE	1.2	1.6	1.5		
Arsenic (As)	mg/kg	< 2	**MCERTS**	8	11	10		
Beryllium (Be)	mg/kg	< 0.5	NONE	< 0.5	0.5	< 0.5		
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1		
Cadmium (Cd)	mg/kg	< 0.2	**MCERTS**	< 0.2	< 0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	**MCERTS**	15	19	17		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	**MCERTS**	10	12	11		
Lead (Pb)	mg/kg	< 3	**MCERTS**	41	55	54		
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	**MCERTS**	5	7	7		
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3		
Vanadium (V)	mg/kg	< 2	NONE	25	31	29		
Zinc (Zn)	mg/kg	< 3	**MCERTS**	52	64	65		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2		

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

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification)

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Graham Revell

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis $^{(S)}$

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4480

Soil Analysis Certificate - Speciated PAHs						
QTS Environmental Report No: 16-44966	**Date Sampled**	10/05/16	10/05/16	10/05/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TPSA	TPSB	TPSC		
Project / Job Ref: 14151	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.25	0.25	0.25		
Reporting Date: 07/06/2016	**QTSE Sample No**	209919	209920	209921		

Determinand	**Unit**	**RL**	**Accreditation**					
Naphthalene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	**MCERTS**	0.12	< 0.1	0.15		
Anthracene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Fluoranthene	mg/kg	< 0.1	**MCERTS**	0.39	0.37	0.38		
Pyrene	mg/kg	< 0.1	**MCERTS**	0.35	0.34	0.34		
Benzo(a)anthracene	mg/kg	< 0.1	**MCERTS**	0.19	0.19	0.19		
Chrysene	mg/kg	< 0.1	**MCERTS**	0.22	0.22	0.21		
Benzo(b)fluoranthene	mg/kg	< 0.1	**MCERTS**	0.32	0.34	0.31		
Benzo(k)fluoranthene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Benzo(a)pyrene	mg/kg	< 0.1	**MCERTS**	0.20	0.19	0.19		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	**MCERTS**	0.14	0.14	0.13		
Dibenz(a,h)anthracene	mg/kg	< 0.1	**MCERTS**	< 0.1	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	**MCERTS**	0.14	0.15	0.13		
Total EPA-16 PAHs	mg/kg	< 1.6	**MCERTS**	2.1	1.9	2		

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

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Soil Analysis Certificate - TPH LQM Banded						
QTS Environmental Report No: 16-44966	**Date Sampled**	10/05/16	10/05/16	10/05/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TPSA	TPSB	TPSC		
Project / Job Ref: 14151	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.25	0.25	0.25		
Reporting Date: 07/06/2016	**QTSE Sample No**	209919	209920	209921		

Determinand	**Unit**	**RL**	**Accreditation**					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
Aliphatic >C8 - C10	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aliphatic >C10 - C12	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aliphatic >C12 - C16	mg/kg	< 3	**MCERTS**	< 3	< 3	< 3		
Aliphatic >C16 - C35	mg/kg	< 10	**MCERTS**	< 10	< 10	< 10		
Aliphatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10		
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30		
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
Aromatic >C8 - C10	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aromatic >C10 - C12	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aromatic >C12 - C16	mg/kg	< 2	**MCERTS**	< 2	< 2	< 2		
Aromatic >C16 - C21	mg/kg	< 3	**MCERTS**	< 3	< 3	< 3		
Aromatic >C21 - C35	mg/kg	< 10	**MCERTS**	< 10	< 10	< 10		
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10		
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	< 30	< 30	< 30		
Total >C5 - C44	mg/kg	< 60	NONE	< 60	< 60	< 60		

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

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Soil Analysis Certificate - BTEX / MTBE						
QTS Environmental Report No: 16-44966	**Date Sampled**	10/05/16	10/05/16	10/05/16		
Soils Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Bath Road	**TP / BH No**	TPSA	TPSB	TPSC		
Project / Job Ref: 14151	**Additional Refs**	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	**Depth (m)**	0.25	0.25	0.25		
Reporting Date: 07/06/2016	**QTSE Sample No**	209919	209920	209921		

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

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

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Soil Analysis Certificate - Sample Descriptions	
QTS Environmental Report No: 16-44966	
Soils Ltd	
Site Reference: Bath Road	
Project / Job Ref: 14151	
Order No: None Supplied	
Reporting Date: 07/06/2016	

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
$ 209919	TPSA	None Supplied	0.25	9	Brown sandy clay
$ 209920	TPSB	None Supplied	0.25	13.5	Brown sandy clay
$ 209921	TPSC	None Supplied	0.25	14.3	Brown sandy clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample I/S
Unsuitable Sample U/S

$ samples exceeded recommended holding times

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Soil Analysis Certificate - Methodology & Miscellaneous Information
QTS Environmental Report No: 16-44966
Soils Ltd
Site Reference: Bath Road
Project / Job Ref: 14151
Order No: None Supplied
Reporting Date: 07/06/2016

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

Appendix E Assessment Criteria for Human Health

HUMAN HEALTH RISK ASSESSMENT

1.1 Introduction

Human Health Generic Quantitative Risk Assessment (GQRA) involves the comparison of contaminant concentrations measured in soil at the site with Generic Assessment Criteria (GAC).

GAC are conservative values adopted to ensure that they are applicable to the majority of possible contaminated site. These values may be published Contaminated Land Exposure Assessment Model (CLEA) derived GAC derived by a third party or the Environment Agency/ DEFRA. It is imperative to the risk assessor to understand the uncertainties and limitations associated with these GAC to ensure that they are used appropriately. Where the adoption of a GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a Detailed Quantitative Risk Assessment (DQRA) may be undertaken to develop site specific values for relevant soil contaminants based on the site specific conditions.

1.2 General Assessment Criteria

The Contaminated Land Regime reflects the UK Government's stated objectives of achieving sustainable development through the 'suitable for use approach'.

1.2.1 Contaminated Land Exposure Assessment Model (CLEA)

Current United Kingdom risk assessment practice is based on the Contaminated Land Exposure Assessment Model (CLEA).

The CLEA Guidance comprises the following documents:
• EA Science Report SC050021/SR2: Human health toxicological assessment of contaminants in soil.
• EA Science Report SC050021/SR3: Updated technical background to the CLEA model.
• EA CLEA Bulletin (2009).
• CLEA software version 1.04 (2009)
• Toxicological reports and SGV technical notes.

The CLEA guidance and tools:
1. do not cover other types of risk to humans, such as fire, suffocation or explosion, or short-term and acute exposures.
2. do not cover risks to the environment, such as groundwater, ecosystems or buildings.
3. do not provide a definitive test for telling when human health risks are significant.
4. are not a legal requirement in assessing land contamination risks. They are not part of the legal regime for Part 2A of the Environmental Protection Act 1990.

1.3 Soil Guideline Values (2009)

The EA are publishing a series of SGV reports for a selection of common contaminants relevant to the assessment of land contamination.
SGV's are generic assessment criteria based on CLEA standard land-uses and can be used to simplify the assessment of human health risks from long-term exposure to

chemical contamination in soil. They do not cover short-term exposure (i.e. construction and maintenance workers), acute exposure or other risks such as fire, suffocation or explosion, as might arise from an accumulation of gases such as methane and carbon dioxide, or either odour or aesthetic issues.

SGV's represent 'trigger values', indicators that soil concentrations above the SGV level may pose a possibility of *significant harm* to human health. The converse, where soil concentrations are less that the SGV, is that the long-term human health risks are considered to be tolerable or minimal.

The CLEA guidance derives soil concentrations of contaminants above which (in the opinion of the EA) there may be a concern that warrants further investigation. It does not provide a definitive test for establishing that the risk is significant.

1.4 Ongoing development of CLEA based guidance

The EA is involved in a programme of publishing SGV's and related toxicity data (the TOX reports). As at July 2009 ten SGV's and matching TOX reports had been published. Soil Assessment Criteria (SAC's) may be derived using toxicity data from the updated TOX reports, where these are published, or from the original TOX reports. SGV reports also take account of recent updates for plant uptake and other factors.

- GAC's developed by CLEA guidance and given in this report will need to be assessed against updated TOX reports and SGV's when these are published.
- SGV reports may give values that differ from the GAC's used in this report.
- These variations may materially alter the remediation requirement for the site, requiring either an increase or decrease in the extent, type and cost of remediation.

1.5 Phytotoxicity

CLEA guidance only addresses human health toxicity; assessment of plant toxicity (phytotoxicity) is based on threshold trigger values obtained from the following source:

ICRCL 70/90: *Notes on the restoration and aftercare of metalliferous mining sites for pasture and grazing*.

1.6 Other Generic Assessment Criteria

If an SGV is not available for a substance identified in the soil then the range of Generic Assessment Criteria published from a collaborative research by Land Quality Management Limited (LQM) and the Chartered Institute of Environmental Health (CIEH) are used for example. In the case of Lead, Category 4 screening levels (C4SLs) have replaced the AtRisk Soil SSV.

1.6.1 CL: AIRE Category 4 screening levels (C4SLs) (2014)

A new statutory DEFRA guidance recently (i.e. August 2014) published some GACs with a more pragmatic (but still strongly precautionary) approach in their derivation called the Category 4 screening levels (C4SLs). These values provide a higher simple test for deciding that land is suitable for use and definitely not

contaminated land. They are intended as generic screening values, (ii) they describe a level of risk that whilst above 'minimal' is still 'low' and (iii) they provide a 'higher simple test' for deciding that land is suitable for use and definitely not contaminated. These values were derived for four generic land uses: residential, commercial, allotments, and public open space.

1.6.2 LQM/CIEH Suitable 4 Use Level (S4UL) (2015)

The new S4UL's ((Nathanail *et al*, 2015), was developed for around 85 substances and are intended to enable a screening assessment of the risks posed by soil quality on development sites. The updated LQM/CIEH GAC publication was developed to accommodate recent developments in the understanding of chemical, toxicological and routine exposure to soil-based contaminants. The S4ULs were:

- based on Health Criteria Values, updated to reflect changes since 2009
- derived for the standard CLEA land uses and the two public open space scenarios developed by Defra SP1010
- developed for ca 85 substances (those previously covered by the LQM/CIEH GAC and the SGV substances);
- Compliant with SR2 and the long standing principle of 'suitable for use' and reflecting changes to exposure parameters produced by Defra SP1010.

For derivation of these Generic Assessment Criteria reference must be made to: Nathanial, P., McCaffrey, C., Ashmore, M., Cheng, Y., Gillet, A., Ogden, R., Scott, D. *The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (3nd edition)*. **Land Quality Press**. 2015.

1.7 Standard Land-use Scenarios

The standard land-use scenarios used to develop conceptual exposure models are presented in the following sections:

1.7.1 Residential

Generic scenario assumes a typical two-storey house built on a ground bearing slab with a private garden having a lawn, flowerbeds and a small fruit and vegetable patch.

•	Critical receptor is a young female child (zero to six years old)
•	Exposure duration is six years.
•	Exposure pathways include direct soil and indoor dust ingestion, consumption of home-grown produce and any adhering soil, skin contact with soils and indoor dust and inhalation of indoor and outdoor dust and vapours.
•	Building type is a two-storey small terraced house.

A sub-set of this land-use is residential apartments with communal landscaped gardens where the consumption of home grown vegetables will not occur.

1.7.2 Allotments

Provision of open space (about 250sq.m) commonly made available to tenants by the local authority to grow fruit and vegetable for their own consumption. Typically, there are a number of plots to a site which may have a total area of up to 1 hectare. The tenants are assumed to be adults and that young children make occasional accompanied visits.

Although some allotment holders may choose to keep animals including rabbits, hens, and ducks, potential exposure to contaminated meat and eggs is not considered.

- Critical receptor is a young female child (zero to six years old)
- Exposure duration is six years.
- Exposure pathways include direct soil ingestion, consumption of homegrown produce and any adhering soil, skin contact with soils and inhalation of outdoor dust and vapours.
- There is no building.

1.7.3 Commercial/Industrial

The generic scenario assumes a typical commercial or light industrial property comprising a three-storey building at which employees spend most time indoors and are involved in office-based or relatively light physical work.

- Critical receptor is a working female adult (aged 16 to 65 years old).
- Exposure duration is a working lifetime of 49 years.
- Exposure pathways include direct soil and indoor dust ingestion, skin contact with soils and dusts and inhalation of dust and vapours.
- Building type is a three-storey office (pre 1970).

1.7.4 Public Open Space within Residential Area

The generic scenario refers to any grassed area 0.05 ha and that is close to Housing.

- Grassed area of up to 0.05 ha and a considerable proportion of this (up to 50%) may be bare soil
- Predominantly used by children for playing and may be used for activities such as a football kick about
- Sufficiently close proximity to home for tracking back of soil to occur, thus indoor exposure pathways apply
- older children as the critical receptor on basis that they will use site most frequently (Age class 4-9)
- ingestion rate 75 $mg.day^{-1}$

1.7.5 *Public Open Space Park*

This generic scenario refers to any public park that is more than 0.5ha in area:

- Public park (>0.5 ha), predominantly grassed and may also contain children's play equipment and border areas of soil containing flowers or shrubs (75% cover)

- Female child age classes 1-6
- Soil ingestion rate of 50 mg.day^{-1}
- Occupancy period outdoors = 2 hours.day^{-1}
- Exposure frequency of 170 days.year-1 for age classes 2-18 and 85
- days.year^{-1} for age class 1
- Outdoor exposure pathways only (no tracking back).

1.8 Detailed Quantitative Risk Assessments (DQRA)

Where the adoption of an SGV/GAC is not appropriate, for instance when the intended land-use is at variance the CLEA standard land-uses, then a DQRA may be undertaking to develop site specific values for relevant soil contaminants.

- Establishing the plausibility that generic exposure pathways exist in practice by measurement and observation.
- Developing more accurate parameters using site data.

1.9 Current Criteria

Table 1 presents the current Generic Assessment Criteria and reference should be made to the original publications if needed**.**

1.10 Statistical Tests

DEFRA R&D Publication CLR 7 (DOE 1994) and CL: AIRE Category 4 screening levels (C4SLs) (2014) addressed the statistical treatment of test results and their comparison to Soil Guideline Values.

Consideration must be given to the appropriate area of land to be considered termed the critical averaging area.

For a communal open space or commercial land-use, the critical averaging area will depend on the proposed layout. For a residential use with private gardens the averaging area is the individual plot.

It may be appropriate to compare the upper 95th percentile concentration with the Soil Guideline Value, subject to applying a statistical test to establish that the range of concentrations are reasonably consistent and belonging to the same underlying distribution of data.

The DEFRA discussion paper Assessing risks from land contamination – a proportionate approach ('the way forward') (CLAN06/2006) aimed to increase understanding of the role that statistics can play in quantifying the uncertainty attached to the estimates of the mean concentration of contaminants in soil. In direct response CLAIRE/CIEH published a joint report, *Guidance in comparing soil contamination data with a critical concentration* (CLAIRE/CIEH 2008). A software implementation of the statistical techniques given in the report was published by ESI International (2008).

Treatment of Hot-Spots
• A statistical test is applied to establish whether the data is a part of a single set, or whether data outliers are present.
• Provided that the data is based on random sampling and no distinct contamination source was present at the sampling location, the hot-spot(s) may be excluded and the mean of the remaining data assessed.

Land Use				Residential With or Without Plant Uptake						Allotments			Commercial			Public Open Space (POS)								
				With home-grown produce			Without home-grown produce									Residential			Park					
			SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	Name	Authority	Date
Type	Contaminants	Species	Year																					
Metals	Arsenic		2014			37			40			49			640			79			168	C4SL	DEFRA	2014
			2015			37			40			40			640			79			170	S4UL	LQM/CIEH	2015
	Beryllium		2015			1.7			1.7			35			12			2.2			63	S4UL	LQM/CIEH	2015
	Boron		2015			290			11000			45			240000			21000			46000	S4UL	LQM/CIEH	2015
	Cadmium		2015			11			85			1.9			190			120			532	S4UL	LQM/CIEH	2015
			2014			26			149			4.9			410			220			880	C4SL	DEFRA	2014
	Chromium	III	2015			910			910			18000			8600			1500			33000	S4UL	LQM/CIEH	2015
		IV	2014			21			21			170			49			23			250	C4SL	DEFRA	2014
		IV	2015			6			6			1.8			33			7.7			220	S4UL	LQM/CIEH	2015
	Copper		2015			2400			7100			520			68000			12000			44000	S4UL	LQM/CIEH	2015
	Lead					200			310			80			2330			630			1300	C4SL	DEFRA	2014
	Mercury	Elemental	2012			1.0			1.0			26			26							SGV	DEFRA	2012
			2015			1.2			1.2			21			58			16			30	S4UL	LQM/CIEH	2015
		Inorganic	2012			170			170			80			36000							SGV	DEFRA	2012
			2015			40			56			19			1100			120			240	S4UL	LQM/CIEH	2015
		Methyl	2012			11			11			8			410							SGV	DEFRA	2012
			2015			11			15			6			320			40			68	S4UL	LQM/CIEH	2015
	Nickel		2012			130			130			230			1800							SGV	DEFRA	2012
			2015			130			180			53			980			230			800	S4UL	LQM/CIEH	2015
	Selenium		2012			350			350			120			13000							SGV	DEFRA	2012
			2015			250			430			88			12000			1100			1800	S4UL	LQM/CIEH	2015
	Vanadium		2015			410			1200			91			9000			2000			5000	S4UL	LQM/CIEH	2015
	Zinc		2015			3700			40000			620			730000			81000			170000	S4UL	LQM/CIEH	2015
BTEX & MTBE	Benzene		2012			0.33			0.33			0.07			95							SGV	DEFRA	2012
			2014			0.87			3.3			0.18			98			140			230	C4SL	DEFRA	2014
			2015	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	27	47	90	72	72	73	90	100	110	S4UL	LQM/CIEH	2015
	Toluene		2012			610			610			120			4400							SGV	DEFRA	2012
			2015	130	290	660	880	1900	3900	22	51	120	65000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015
	Ethylbenzene		2012			350			350			90			2800							SGV	DEFRA	2012
			2015	47	110	260	83	190	440	16	39	91	4700	13000	27000	24000	24000	25000	17000	22000	27000	S4UL	LQM/CIEH	2015
	Xylenes	o-xylene	2012			250			250			160			2600							SGV	DEFRA	2012
			2015	60	140	330	88	210	480	28	67	160	6600	15000	33000	41000	42000	43000	17000	24000	33000	S4UL	LQM/CIEH	2015
		m-xylene	2012			240			240			180			3500							SGV	DEFRA	2012
			2015	59	140	320	82	190	450	31	74	170	6200	14000	31000	41000	42000	43000	17000	24000	32000	S4UL	LQM/CIEH	2015
		p-xylene	2012			230			230			160			3200							SGV	DEFRA	2012
			2015	56	130	310	79	180	310	29	69	160	5900	14000	30000	41000	42000	43000	17000	23000	31000	S4UL	LQM/CIEH	2015
Petroleum Hydrocarbons Fractions	Aliphatic >C5 - C6		2015	42	78	160	42	78	160	730	1700	3900	3200	5900	12000	570000	590000	600000	95000	130000	180000	S4UL	LQM/CIEH	2015
	Aliphatic >C6 - C8		2015	100	230	530	100	230	530	2300	5600	13000	7800	17000	40000	600000	610000	620000	150000	220000	320000	S4UL	LQM/CIEH	2015
	Aliphatic >C8 - C10		2015	27	65	150	27	65	150	320	770	1700	2000	4800	11000	13000	13000	13000	14000	18000	21000	S4UL	LQM/CIEH	2015
	Aliphatic >C10 - C12		2015	130	330	760	130	330	770	2200	4400	7300	9700	23000	47000	13000	13000	13000	21000	23000	24000	S4UL	LQM/CIEH	2015
	Aliphatic >C12 - C16		2015	1100	2400	4300	1100	2400	4400	11000	13000	13000	59000	82000	90000	13000	13000	13000	25000	25000	26000	S4UL	LQM/CIEH	2015
	Aliphatic >C16 - C35		2015	65000	92000	110000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aliphatic >C35 - C44		2015	65000	92000	140000	65000	92000	110000	260000	270000	270000	1600000	1700000	1800000	250000	250000	250000	450000	480000	490000	S4UL	LQM/CIEH	2015
	Aromatic >C5 - C7		2015	70	140	300	370	690	1400	13	27	57	26000	46000	86000	56000	56000	56000	76000	84000	92000	S4UL	LQM/CIEH	2015
	Aromatic >C7 - C8		2015	130	290	660	860	1800	3900	22	51	120	56000	110000	180000	56000	56000	56000	87000	95000	100000	S4UL	LQM/CIEH	2015
	Aromatic >C8 - C10		2015	34	83	190	47	110	270	8.6	21	51	3500	8100	17000	5000	5000	5000	7200	8500	9300	S4UL	LQM/CIEH	2015
	Aromatic >C10 - C12		2015	74	180	380	250	590	1200	13	31	74	16000	28000	34000	5000	5000	5000	9200	9700	10000	S4UL	LQM/CIEH	2015
	Aromatic >C12 - C16		2015	140	330	660	1800	2300	2500	23	57	130	36000	37000	38000	5100	5100	5000	10000	10000	10000	S4UL	LQM/CIEH	2015
	Aromatic >C16 - C21		2015	260	540	930	1900	1900	1900	46	110	260	28000	28000	28000	3800	3800	3800	7600	7700	7800	S4UL	LQM/CIEH	2015
	Aromatic >C21 - C35		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
	Aromatic >C34 - C44		2015	1100	1500	1700	1900	1900	1900	370	820	1600	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015

Land Use				Residential With or Without Plant Uptake						Allotments			Commercial			Public Open Space (POS)								
				With home-grown produce			Without home-grown produce									Residential			Park					
			SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6			
Type	Contaminants	Species	Year																			Name	Authority	Date
	Aliphatic + Aromatic >C44 - C70			1600	1800	1900	1900	1900	1900	1200	2100	3000	28000	28000	28000	3800	3800	3800	7800	7800	7900	S4UL	LQM/CIEH	2015
Polycyclic Aromatic Hydrocarbons (PAH's) (mg/kg)	Acenaphthene		2015	210	510	1100	3000	4700	6000	34	85	200	84000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Acenaphthylene		2015	170	420	920	2900	4600	6000	28	69	160	83000	97000	100000	15000	15000	15000	29000	30000	30000	S4UL	LQM/CIEH	2015
	Anthracene		2015	2400	5400	11000	31000	35000	37000	380	950	2200	520000	54000	540000	74000	74000	74000	150000	150000	150000	S4UL	LQM/CIEH	2015
	Benzo(a)anthracene		2015	7.2	11	13	11	14	15	2.9	6.5	13	170	170	180	29	29	29	49	56	62	S4UL	LQM/CIEH	2015
	Benzo(a)pyrene		2014			5			5.3			5.7			76			10			21	C4SL	DEFRA	2014
			2015	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	35	35	36	5.7	5.7	5.7	11	12	13	S4UL	LQM/CIEH	2015
	Benzo(b)fluoranthene		2015	2.6	3.3	3.7	3.9	4.0	4.0	0.99	2.1	3.9	44	44	45	7.1	7.2	7.2	13	15	16	S4UL	LQM/CIEH	2015
	Benzo(ghi)perylene		2015	320	340	250	360	360	360	290	470	640	3900	4000	4000	640	640	640	1400	1500	1600	S4UL	LQM/CIEH	2015
	Benzo(k)fluoranthene		2015	77	93	100	110	110	110	37	75	130	1200	1200	1200	190	190	190	370	410	440	S4UL	LQM/CIEH	2015
	Chrysene		2015	15	22	27	30	31	32	4.1	9.4	19	350	350	350	57	57	57	93	110	120	S4UL	LQM/CIEH	2015
	Dibenz(a,h)anthracene		2015	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.43	3.5	3.6	3.6	0.57	0.57	0.58	1.1	1.3	1.4	S4UL	LQM/CIEH	2015
	Fluoranthene		2015	280	560	890	1500	1600	1600	52	130	290	23000	23000	23000	3100	3100	3100	6300	6300	6400	S4UL	LQM/CIEH	2015
	Fluorene		2015	170	400	860	2800	3800	4500	27	67	160	63000	68000	71000	9900	9900	9900	20000	20000	20000	S4UL	LQM/CIEH	2015
	Indeno(1,2,3-cd)pyrene		2015	27	36	41	45	46	46	9.5	21	39	500	510	510	82	82	82	150	170	180	S4UL	LQM/CIEH	2015
	Naphthalene		2015	2.3	5.6	13	2.3	5.6	13	4.1	10	24	190	460	1100	4900	4900	4900	1200	1900	3000	S4UL	LQM/CIEH	2015
	Phenanthrene		2015	95	220	440	1300	1500	1500	15	38	90	22000	22000	23000	3100	3100	3100	6200	6200	6300	S4UL	LQM/CIEH	2015
	Pyrene		2015	620	1200	2000	3700	3800	3800	110	270	620	54000	54	54000	7400	7400	4700	15000	15000	15000	S4UL	LQM/CIEH	2015
	Coal Tar(Bap as surrogate matter)		2015	0.79	0.98	1.1	1.2	1.2	1.2	0.32	0.67	1.2	15	15	15	2.2	2.2	2.2	4.4	4.7	4.8	S4UL	LQM/CIEH	2015
Chloroalkanes & alkenes	1,2 Dichloroethane		2015	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	0.67	0.97	1.7	29	29	29	21	24	28	S4UL	LQM/CIEH	2015
	1,1,1 Trichloroethane		2015	8.8	18	39	9	18	40	48	110	240	660	1300	3000	140000	140000	140000	57000	76000	100000	S4UL	LQM/CIEH	2015
	1,1,2,2 Tetrachloroethane		2015	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	270	550	1100	1400	1400	1400	1800	2100	2300	S4UL	LQM/CIEH	2015
	1,1,1,2 Tetrachloroethane		2015	1.2	2.8	6.4	1.5	3.5	8.2	0.79	1.9	4.4	110	250	560	1400	1400	1400	1500	1800	2100	S4UL	LQM/CIEH	2015
	Tetrachloroethene		2015	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	19	42	95	1400	1400	1400	810	1100	1500	S4UL	LQM/CIEH	2015
	Tetrachloromethane (Carbon Tetrachloride)		2015	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	2.9	6.3	14	890	920	950	190	270	400	S4UL	LQM/CIEH	2015
	Trichloroethene		2015	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	1.2	2.6	5.7	120	120	120	70	91	120	S4UL	LQM/CIEH	2015
	Trichloromethane		2015	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	99	170	350	2500	2500	2500	2600	2800	3100	S4UL	LQM/CIEH	2015
	Vinyl Chloride (cloroethene)		2015	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	0.059	0.077	0.12	3.5	3.5	3.5	4.8	5	5.4	S4UL	LQM/CIEH	2015
Explosives	2,4,6 Trinitrotoluene		2015	1.6	3.7	8.1	65	66	66	0.24	0.58	1.4	1000	1000	1000	130	130	130	260	270	270	S4UL	LQM/CIEH	2015
	RDX (Hexogen/Cyclonite/1,3,5-trinitro-1,3,5-triazacyclohexane)		2015	120	250	540	13000	13000	13000	17	38	85	210000	210000	210000	26000	26000	27000	49000	51000	53000	S4UL	LQM/CIEH	2015
	HMX (Octogen/1,3,5,7-tetrenitro-1,3,5,7-tetrazacyclo-octane)		2015	5.7	13	26	6700	6700	6700	0.86	1.9	3.9	110000	110000	110000	13000	13000	13000	23000	23000	24000	S4UL	LQM/CIEH	2015
Pesticides	Aldrin		2015	5.7	6.6	7.1	7.3	7.4	7.5	3.2	6.1	9.6	170	170	170	18	18	18	30	31	31	S4UL	LQM/CIEH	2015
	Dieldrin		2015	0.97	2	3.5	7	7.3	7.4	0.17	0.41	0.96	170	170	170	18	18	18	30	30	31	S4UL	LQM/CIEH	2015
	Atrazine		2015	3.3	7.6	17.4	610	620	620	0.5	1.2	2.7	9300	9400	9400	1200	1200	1200	2300	2400	2400	S4UL	LQM/CIEH	2015
	Dichlorvos		2015	0.032	0.066	0.14	6.4	6.5	6.6	0.0049	0.01	0.022	140	140	140	16	16	16	26	26	27	S4UL	LQM/CIEH	2015
	Alpha - Endosulfan		2015	7.4	18	41	160	280	410	1.2	2.9	6.8	5600	7400	8400	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Beta - Endosulfan		2015	7	17	39	190	320	440	1.1	2.7	6.4	6300	7800	8700	1200	1200	1200	2400	2400	2500	S4UL	LQM/CIEH	2015
	Alpha -Hexachlorocyclohexanes		2015	0.23	0.55	1.2	6.9	9.2	11	0.035	0.087	0.21	170	180	180	24	24	24	47	48	48	S4UL	LQM/CIEH	2015
	Beta -Hexachlorocyclohexanes		2015	0.085	0.2	0.46	3.7	3.8	3.8	0.013	0.032	0.077	65	65	65	8.1	8.1	8.1	15	15	16	S4UL	LQM/CIEH	2015
	Gamma -Hexachlorocyclohexanes		2015	0.06	0.14	0.33	2.9	3.3	3.5	0.0092	0.023	0.054	67	69	70	8.2	8.2	8.2	14	15	15	S4UL	LQM/CIEH	2015
Chlorobenzenes	Chlorobenzene		2015	0.46	1	2.4	0.46	1	2.4	5.9	14	32	56	130	290	11000	13000	14000	1300	2000	2900	S4UL	LQM/CIEH	2015
	1,2-Dichlorobenzene		2015	23	55	130	24	57	130	94	230	540	2000	4800	11000	90000	95000	98000	24000	36000	51000	S4UL	LQM/CIEH	2015
	1,3-Dichlorobenzene		2015	0.4	1	2.3	0.44	1.1	2.5	0.25	0.6	1.5	30	73	170	300	300	300	390	440	470	S4UL	LQM/CIEH	2015
	1,4-Dichlorobenzene		2015	61	150	350	61	150	350	15	37	88	4400	10000	25000	17000	17000	1700	36000	36000	36000	S4UL	LQM/CIEH	2015
	1,2,3,-Trichlorobenzene		2015	1.5	3.6	8.6	1.5	3.7	8.8	4.7	12	28	102	250	590	1800	1800	1800	770	1100	1600	S4UL	LQM/CIEH	2015
	1,2,4,-Trichlorobenzene		2015	2.6	6.4	15	2.6	6.4	15	55	140	320	220	530	1300	15000	17000	19000	1700	2600	4000	S4UL	LQM/CIEH	2015
	1,3,5,-Trichlorobenzene		2015	0.33	0.81	1.9	0.33	0.81	1.9	4.7	12	28	23	55	130	1700	1700	1800	380	580	860	S4UL	LQM/CIEH	2015
	1,2,3,4,-Tetrachlorobenzene		2015	15	36	78	24	56	120	4.4	11	26	1700	3080	4400	830	830	830	1500	1600	1600	S4UL	LQM/CIEH	2015
	1,2,3,5,- Tetrachlobenzene		2015	0.66	1.6	3.7	0.75	1.9	4.3	0.38	0.9	2.2	49	120	240	78	79	79	110	120	130	S4UL	LQM/CIEH	2015
	1,2,4, 5,- Tetrachlobenzene		2015	0.33	0.77	1.6	0.73	1.7	3.5	0.06	0.16	0.37	42	72	96	13	13	13	25	26	26	S4UL	LQM/CIEH	2015

Land Use				Residential With or Without Plant Uptake						Allotments			Commercial			Public Open Space (POS)								
				With home-grown produce			Without home-grown produce									Residential			Park					
			SOM	1.0	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	1	2.5	6	Name	Authority	Date
Type	Contaminants	Species	Year																					
	Pentachlrobenzene		2015	5.8	12	22	19	30	38	1.2	3.1	7	*640*	*770*	*830*	100	100	100	190	190	190	S4UL	LQM/CIEH	2015
	Hexachlorobenzene		2015	*1.8*	*3.3*	4.9	*4.1*	*5.7*	*6.7*	0.47	1.1	2.5	*110*	120	120	16	16	16	30	30	30	S4UL	LQM/CIEH	2015
Phenols & Chlorophenols	Phenols		2012			420			420			280			*3200*							SGV	DEFRA	2012
			2015	120	200	380	440	690	1200	23	42	83	*440*	*690*	*1300*	*440*	*690*	*1300*	*440*	*690*	*1300*	S4UL	LQM/CIEH	2015
	Chlorophenols (4 Congeners)		2015	0.87	2	4.5	94	150	210	0.13	0.3	0.7	3500	4000	4300	620	620	620	1100	1100	1100	S4UL	LQM/CIEH	2015
	Pentachlorophenols		2015	0.22	0.52	1.2	27	29	31	0.03	0.08	0.19	400	400	400	60	60	60	110	120	120	S4UL	LQM/CIEH	2015
Others	Carbon Disulphide		2015	0.14	0.29	0.62	0.14	0.29	0.62	4.8	10	23	11	22	47	11000	11000	12000	1300	1900	2700	S4UL	LQM/CIEH	2015
	Hexachloro-1,3-Butadiene		2015	0.29	0.7	1.6	0.32	0.78	1.8	0.25	0.61	1.4	31	66	120	25	25	25	48	50	51	S4UL	LQM/CIEH	2015
	Sum of PCDDs, PCDFs and dioxin-like PCB's.		2012			8			8			8			240							SGV	DEFRA	2012

NOTE

Priority	Guideline (mg kg $^{-1}$)
1	Site Specific Assessment Criteria (SSAC) (Soils Limited)
2	2014: Category 4 Screening Level (C4SL) (Contaminated Land: Application in Real Environment (CL:ARE), 2014)
3	2012: Soil Guideline Value (SGV) (Environment Agency, 2009)
4	2015: Suitable 4 Use Level (S4UL) (Nathanail *et al*, 2015)
	For Generic Risk Assessment, the values in Bold have priority

Appendix F Photographs

Photo 1: April 2016, showing areas of reduced dig

Photo 2: April 2016, showing areas of reduced dig

Photo 3: April 2016, showing areas of reduced dig

Photo 4: April 2016, showing areas of reduced dig

Photo 5: April 2016, showing areas of reduced dig

Photo 6: 10th May 2016, showing validation works at communal soft landscaping areas

Photo 7: 10th May 2016, showing validation works at communal soft landscaping areas

Photo 8: General views from finished communal soft landscaping areas – 10th May 2016

Photo 9: General views from finished communal soft landscaping areas – 10th May 2016

Photo 10: Communal soft landscaping area of formerly impacted location (TPS2) – 31st May 2016

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