

## Foreman Homes

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11<sup>th</sup> May 2015

Your ref: Ranelagh Road Discharge of Conditions APP/14/01262

Our ref: Letter Report: I4933/ESFM

Dear Sirs,

FAO: Michael Avery

### **Re: Human Health Risk Assessment- Land South of Ranelagh Road, Havant, Hampshire, PO9 1NR**

This letter report complements the Lead Human Health Risk Assessment provided as part of the above development. It must be read in conjunction with the Reports presented in Table I. We have relied on these reports, the soil testing carried out at the site and the subsequent communications between Havant Borough Council and Soils Limited in the preparation of this letter report.

**Table I. Previous Reports**

| Reference          | Report                               | Author                    | Date          |
|--------------------|--------------------------------------|---------------------------|---------------|
| I4099/GIR          | Phase II Ground Investigation Report | Soils Limited (L. Howell) | February 2014 |
| I4099/PL           | Letter Report                        | Soils Limited (L. Howell) | February 2014 |
| I4099/GIR          | Phase II Ground Investigation Report | Soils Limited (L. Howell) | March 2014    |
| I4099/GIR/Rev 2.00 | Phase II Ground Investigation Report | Soils Limited (L. Howell) | December 2014 |

Following further discussions, Havant Borough Council requested further data to characterise the superficial soil for the design of appropriate remediation measures, if required. Additional 10no. near surface soil samples were recovered from across the site and laboratory testing was carried out in April 2015 (i.e. HPI-HP10, Appendix A) in order to complement previous results and also to enable a further statistical analysis to be undertaken on the resulting data set.

### **The Site and Proposed Redevelopment**

At the time of the site investigation presented in Table I, the site was located south of Ranelagh Road, in Havant, Hampshire and had an approximate site area of 2.5ha. The development was to include the erection of 81no. dwellings consisting of 10no. two-bed flats, 12no. two-bed flats, 6no. two-bed houses and 53no. three-bed houses. The proposed redevelopment included soft and hard landscaping such as access roads and private gardens.

### **Sampling Design**

Samples were collected from the near surface soils (i.e. 0.0-0.6m bgl) for testing in order to assess risk to human health. The total site area was 2.5ha, therefore, the 31no. samples (over all phases of intrusive works) that were recovered for testing at the site were considered sufficient in view of the area of the site.



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## Human Health Risk Assessment

The assessment was based on the following:

- The existing plan (i.e. Drawing by Reuby & Stagg Ltd, Number 002, dated 17/06/12)
- The proposed development plan (i.e. Drawing by ADP Architects Ltd., Number 01, dated May 2014)).
- The information about the nature, extend and distribution of the potential contaminant revealed by the intrusive site investigation to date,

The drawings were provided by the client and are appended to this letter (Appendix A).

Any change or deviation from the scheme outlined in the drawing could invalidate the remediation recommendations presented within this report. Soils Limited must be notified about any such changes.

Concentrations of contaminants tested were to be compared against Published United Kingdom SGVs, the new DEFRA C4SL values, Soil Screening Values (SSV) and LQM/CIEH Suitable 4 Use Levels (S4ULs) published in 2015 where appropriate to assess risk to human health. The assessment criteria used to assess risks to human health are explained within Appendix B.

The results of the contamination testing are appended to this report (Appendix C) and the significant results of the assessment are presented in Table 2. The assessment was carried out using GAC for residential land-use scenario and shown on the development plan provided by the developer appended to this letter report (Appendix A).

The results show that the shallow ground contained elevated concentrations of lead in some areas as presented in Table 2.

The statistical analyses (Appendix D) of the results (i.e. including the outlier) of the 31 no. shallow samples recovered from depths not exceeding 0.6m bgl revealed the Upper 95<sup>th</sup> Percentile Concentration of 174.2mg kg<sup>-1</sup>, which was below the most conservation guideline for residential with home ground produce end usage. The Upper 95<sup>th</sup> Percentile Concentration of the results excluding the outlier was 154.3 mg kg<sup>-1</sup> which also below the critical concentration of 200 mg kg<sup>-1</sup>.

The outlying lead concentration (i.e. Hotspot) of 385.0 mg kg<sup>-1</sup> for the sample recovered from WS8 (i.e. sample recovered at 0.3m bgl) cannot be removed from the data set and must be dealt with separately, as discussed later in this report. The area is located in the proposed garden area of Plot 75 therefore different exposure pathways to the future resident exist. The statistical analysis carried out with the dataset excluding the outlier suggested that no further hotspots exist and that the true population mean (i.e. the 95% UCL) was less than the critical concentration of 200 mg kg<sup>-1</sup> for residential with home grown produce suggesting that no further actions are warranted. Therefore, with the exception of the proposed garden areas around WS8, remediation actions would only be undertaken in the proposed residential garden areas as a precautionary measure only.

The assessment has also shown that the results of the soil testing revealed no concentrations in excess of the relevant guideline values for public open space usages in a residential setting. The near surface soils tested could therefore be re-used communal garden areas, if present.

**Table 2 Summary of Chemical Analysis and Statistical Analyses of Soils Samples**

| Chemical                                                                          | Samples | Depth (m bgl) | Exceedances of 200<br>(mg kg <sup>-1</sup> ) | Comments                                              |
|-----------------------------------------------------------------------------------|---------|---------------|----------------------------------------------|-------------------------------------------------------|
| Lead                                                                              | WS2     | 0.3           | 290.0                                        | Not suitable for residential with home grown produce* |
|                                                                                   | TP2     | 0.5           | 223.0                                        |                                                       |
|                                                                                   | HP3     | 0.3           | 275.0                                        |                                                       |
|                                                                                   | WS8     | 0.4           | 385.0                                        |                                                       |
| Statistical Analysis Of The Soil Results For Lead (With WS8)                      |         |               |                                              |                                                       |
|                                                                                   |         |               | mg kg <sup>-1</sup>                          |                                                       |
| Number of samples tested                                                          |         |               | 31.0                                         |                                                       |
| Standard deviation                                                                |         |               | 99.4                                         |                                                       |
| Mean                                                                              |         |               | 95.5                                         |                                                       |
| Upper 95 <sup>th</sup> Percentile Concentration                                   |         |               | 174.2                                        |                                                       |
| Hotspot                                                                           |         |               | 385.0                                        | Area of WS8:<br>Remediation necessary                 |
| Statistical Analysis Of The Soil Results For Lead (Without WS8)                   |         |               |                                              |                                                       |
| Number of samples tested                                                          |         |               | 30                                           |                                                       |
| Standard deviation                                                                |         |               | 80.9                                         |                                                       |
| Mean                                                                              |         |               | 90.0                                         |                                                       |
| Upper 95 <sup>th</sup> Percentile Concentration                                   |         |               | 154.3                                        |                                                       |
| Hotspot                                                                           |         |               | None                                         | Areas other than WS8:<br>Remediation not necessary    |
| Risk Assessment For Lead                                                          |         |               |                                              |                                                       |
| Proposed Land use: Residential                                                    |         |               | GAC (mg Kg-l)                                | 95 % UCL DO NOT EXCEED GAC                            |
| With home-grown produce                                                           |         |               | 200.0                                        |                                                       |
| Without home-grown produce                                                        |         |               | 310.0                                        |                                                       |
| Public Open Space (POS)                                                           |         |               | 630.0                                        |                                                       |
| Notes: * where results taken as standalone (i.e. no statistical analysis applied) |         |               |                                              |                                                       |

**Remediation for Lead**

Re-evaluation of the conceptual site model has revealed that plausible pollutant linkages remain after the risk assessment and further actions are warranted. There are three main ways to reduce or control unacceptable risks in land contamination applications:

- Remove or treat the (source) of pollutant(s);
- Remove or modify the pathway(s);
- Remove or modify the behaviour of receptor(s).

The remediation strategy addresses the risk removal with respect to human health and specific to the area set by the brief for the investigation. It should be considered in conjunction with an overall development plan of the site.

Table 3 presents remediation options that may also be used for remediating the Lead contaminated soils identified within the area of WS8. The higher the concentration of lead in the imported soil, the deeper the cover system required. The final depth of cover system required for residential gardens will depend on the concentration of lead in the imported Topsoil as presented in Table 4. Different scenarios were simulated using different concentrations of Lead in the Topsoil to be imported on site.

The proposal for up to 600mm of clean material to be adopted in the garden areas as previously recommended by Soils Limited was conservative yet appropriate in this occasion. The potentially

contaminated soils as presented in Table 2 could however be re-used within communal garden areas, if proposed, at the site.

**Table 3 Remediation Option (Area of WS8)**

| Option | Description                                                                     | Comments              |
|--------|---------------------------------------------------------------------------------|-----------------------|
| 1      | Remove Lead contaminated soils in location of WS8 and validate (i.e. 0.5m deep) | Soil export/Import    |
| 2      | Cover System to raise site levels in impacted garden areas (i.e. WS8)           | Soil import           |
| 3      | Paved area around hotspot                                                       | No soil export/Import |

**Table 4 Cover System Design (i.e. using BRE, 2005)**

| Concentration<br>mg kg <sup>-1</sup> | Maximum Depth of the<br>cover system (mm) | Lead of Cover (Cc)<br>mg kg <sup>-1</sup> | Remediation                                                                                                             |
|--------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 223                                  | 68                                        | 20                                        | Areas other than WS8:<br>Cover system not<br>required because no<br>hotspot identified                                  |
| 223                                  | 80                                        | 50                                        |                                                                                                                         |
| 223                                  | 112                                       | 100                                       |                                                                                                                         |
| 223                                  | 189                                       | 150                                       |                                                                                                                         |
| 290                                  | 200                                       | 20                                        |                                                                                                                         |
| 290                                  | 225                                       | 50                                        |                                                                                                                         |
| 290                                  | 284                                       | 100                                       |                                                                                                                         |
| 290                                  | 368                                       | 150                                       |                                                                                                                         |
| 385                                  | 304                                       | 20                                        | Area of WS8:<br>Warranted if area to<br>remain as soft<br>landscaping. If area<br>paved, no action will<br>be warranted |
| 385                                  | 331                                       | 50                                        |                                                                                                                         |
| 385                                  | 389                                       | 100                                       |                                                                                                                         |
| 385                                  | 472                                       | 150                                       |                                                                                                                         |

Please do not hesitate to contact the undersigned should you require clarification on any of the points or conclusions raised in this letter report.

Best regards,



Eliane S. Foteu Madio *B.Sc. (Hons), M.Sc. (Hons), M.Sc., Ph.D.*  
**Chief Environmental Consultant**

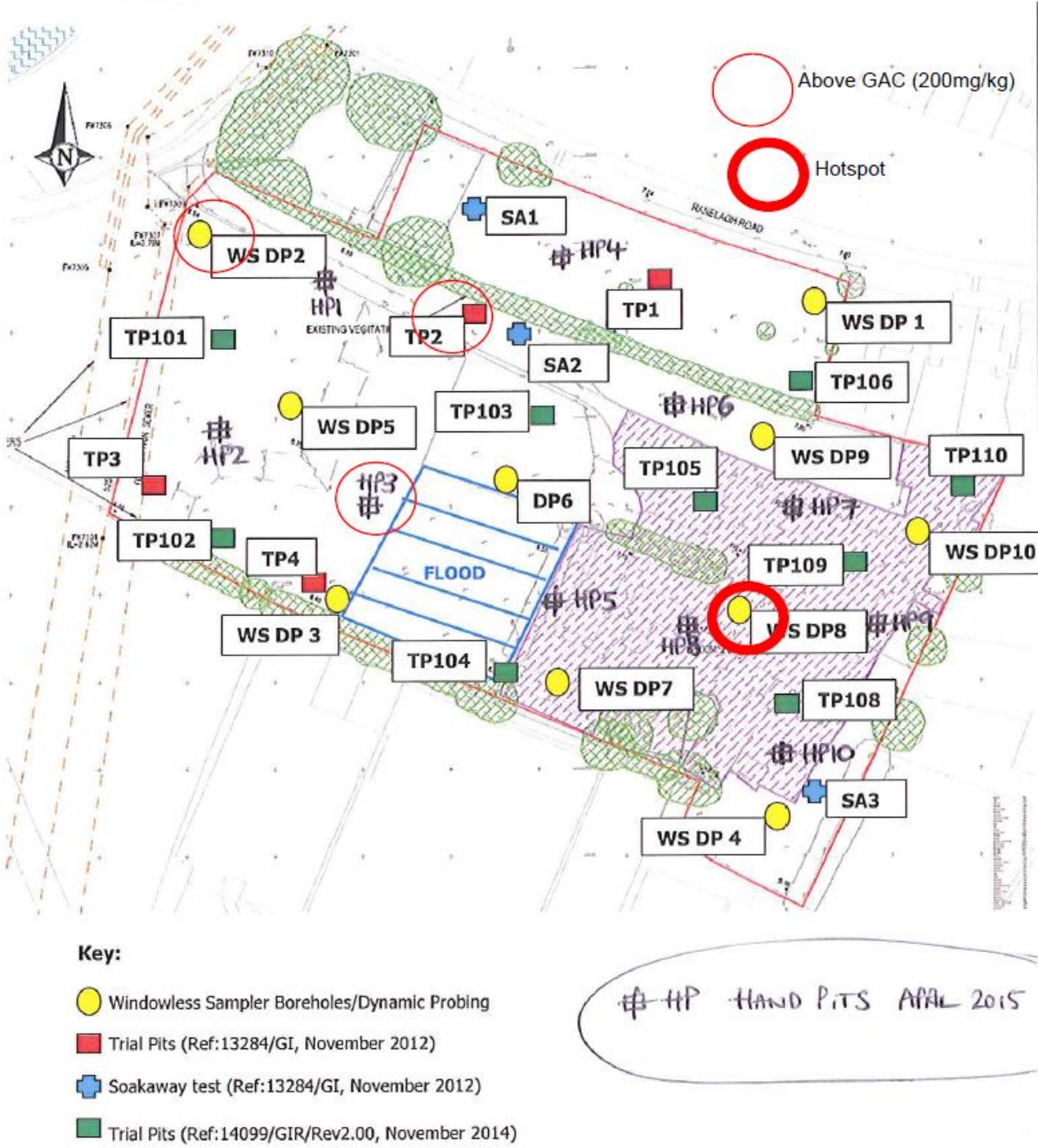
For and on Behalf of Soils Limited

APPENDIX A-Plans



| Samples m gbl | Lead (mg/kg) | Proposed Plan                     |
|---------------|--------------|-----------------------------------|
| WS2           | 0.3          | 290.0 (Garden area of Plot 16)    |
| TP2           | 0.5          | 223.0 (Garden area of Plot 12)    |
| HP3           | 0.3          | 275.0 (Garden area of Plot 63-68) |
| WS8           | 0.4          | 385.0 (Gardens of Plot 75)        |

Proposed Layout Plan



Existing Layout Plan Showing the Trial Pit Location



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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------|--------|
| P1                                                                                                                                                                                     | 27/06/12 | MTAL ISSUE           | RHS    |
| date                                                                                                                                                                                   | date     | description          | author |
| Project                                                                                                                                                                                |          |                      |        |
| PROPOSED DEVELOPMENT, RANELASH ROAD, HAVANT                                                                                                                                            |          |                      |        |
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| drawn                                                                                                                                                                                  | RHS      | checked              | AI     |
| project no.                                                                                                                                                                            | 9964     | drawing no.          | 002    |
| revision                                                                                                                                                                               |          | revision             | P1     |



## **APPENDIX B- Human Health Assessment Criteria**

## 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).

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##### The CLEA Guidance comprises the following documents:

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- 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.
- 

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##### The CLEA guidance and tools:

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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 than 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: Nathanail, P., McCaffrey, C., Ashmore, M., Cheng, Y., Gillet, A., Ogden, R., Scott, D. *The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment* (3<sup>rd</sup> 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<sup>-1</sup>
- 

### 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 <sup>-1</sup>                                |
| • Occupancy period outdoors = 2 hours.day <sup>-1</sup>                         |
| • Exposure frequency of 170 days.year <sup>-1</sup> for age classes 2-18 and 85 |
| • days.year <sup>-1</sup> 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 undertaken 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 95<sup>th</sup> 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).

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**Treatment of Hot-Spots**

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- 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 Plan Uptake |       |       |         |       |       |            |        |        | Public Open Space (POS) |         |         |             |        |        |        |        |        | Name   | Authority | Date     |          |      |
|----------------------------------|----------------------|-----------|-----------------------------------------|-------|-------|---------|-------|-------|------------|--------|--------|-------------------------|---------|---------|-------------|--------|--------|--------|--------|--------|--------|-----------|----------|----------|------|
|                                  |                      |           | With                                    |       |       | Without |       |       | Allotments |        |        | Commercial              |         |         | 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                                    |       |       |         |       |       |            |        |        |                         |         |         |             |        |        |        |        |        |        |           |          |          |      |
| 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                                    |       |       | 180     |       |       | 180        |        |        |                         | 230     |         |             | 980    |        |        | 230    |        |        | 3400      | 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 Plan Uptake |         |        |         |        |        |            |        |        | Public Open Space (POS) |        |        |             |        |        |        |        |        | Name | Authority | Date     |      |  |  |
|--------------------------------------------------|----------------------------------------------------------------|--------------------|-----------------------------------------|---------|--------|---------|--------|--------|------------|--------|--------|-------------------------|--------|--------|-------------|--------|--------|--------|--------|--------|------|-----------|----------|------|--|--|
|                                                  |                                                                |                    | With                                    |         |        |         |        |        | Allotments |        |        | Commercial              |        |        | 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                                    |         |        |         |        |        |            |        |        |                         |        |        |             |        |        |        |        |        |      |           |          |      |  |  |
| Polycyclic Aromatic Hydrocarbons (PAH's) (mg/kg) | 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 |  |  |
|                                                  | 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 (chloroethene)                    |                                                                | 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  |          |      |  |  |

| Land Use                |                                                               |                                                                                                             | Residential With or Without Plan Uptake |                    |      |         |      |      |            |      |      | Public Open Space (POS) |      |      |             |       |       |       |      |      | Name | Authority | Date     |      |
|-------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------|------|---------|------|------|------------|------|------|-------------------------|------|------|-------------|-------|-------|-------|------|------|------|-----------|----------|------|
|                         |                                                               |                                                                                                             | With                                    |                    |      | Without |      |      | Allotments |      |      | Commercial              |      |      | Residential |       |       | Park  |      |      |      |           |          |      |
|                         |                                                               |                                                                                                             | home-grown produce                      | home-grown produce |      |         |      |      |            |      |      |                         |      |      |             |       |       |       |      |      |      |           |          |      |
| Type                    | Contaminants                                                  | Species                                                                                                     | Year                                    | 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         |          |      |
| Phenols & Chlorophenols | Pentachlorobenzene                                            |                                                                                                             | 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                                                       |                                                                                                             | 2012                                    |                    |      | 420     |      | 420  |            |      | 280  |                         | 3200 |      |             |       | SGV   | DEFRA | 2012 |      |      |           |          |      |
|                         |                                                               |                                                                                                             | 2015                                    | 280                | 550  | 1100    | 750  | 1300 | 2300       | 66   | 140  | 280                     | 760  | 1500 | 3200        | 760   | 1500  | 3200  | 760  | 1500 | 3200 | 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 <sup>-1</sup> )                                                                            |                                         |                    |      |         |      |      |            |      |      |                         |      |      |             |       |       |       |      |      |      |           |          |      |
|                         | 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 <i>et al</i> , 2015)                                           |                                         |                    |      |         |      |      |            |      |      |                         |      |      |             |       |       |       |      |      |      |           |          |      |
|                         | For Generic Risk Assessment, the values in Bold have priority |                                                                                                             |                                         |                    |      |         |      |      |            |      |      |                         |      |      |             |       |       |       |      |      |      |           |          |      |

## **APPENDIX C- Results of Soil Testing**



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## **QTS Environmental Report No: 15-30721**

**Site Reference:** Ranelagh Road

**Project / Job Ref:** 14933

**Order No:** None Supplied

**Sample Receipt Date:** 20/04/2015

**Sample Scheduled Date:** 20/04/2015

**Report Issue Number:** 1

**Reporting Date:** 23/04/2015

**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  
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Maidstone  
Kent ME17 2JN  
Tel : 01622 850410



| Soil Analysis Certificate             |                 |               |               |               |               |               |
|---------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| QTS Environmental Report No: 15-30721 | Date Sampled    | 16/04/15      | 16/04/15      | 16/04/15      | 16/04/15      | 16/04/15      |
| Soils Ltd                             | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Ranelagh Road         | TP / BH No      | HP1           | HP2           | HP3           | HP4           | HP5           |
| Project / Job Ref: 14933              | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied               | Depth (m)       | 0.10          | 0.30          | 0.30          | 0.50          | 0.50          |
| Reporting Date: 23/04/2015            | QTSE Sample No  | 145335        | 145336        | 145337        | 145338        | 145339        |

| Determinand    | Unit  | RL    | Accreditation |       |       |       |       |       |
|----------------|-------|-------|---------------|-------|-------|-------|-------|-------|
| Arsenic (As)   | mg/kg | < 2   | MCERTS        | 7     | 4     | 7     | 5     | 5     |
| Barium (Ba)    | mg/kg | < 5   | NONE          | 88    | 62    | 101   | 80    | 106   |
| Beryllium (Be) | mg/kg | < 0.5 | NONE          | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| W/S Boron      | mg/kg | < 1   | NONE          | < 1   | < 1   | < 1   | < 1   | < 1   |
| Cadmium (Cd)   | mg/kg | < 0.2 | MCERTS        | < 0.2 | 0.2   | 0.4   | < 0.2 | 0.3   |
| Chromium (Cr)  | mg/kg | < 2   | MCERTS        | 32    | 21    | 30    | 31    | 21    |
| Copper (Cu)    | mg/kg | < 4   | MCERTS        | 6     | 10    | 28    | 12    | 24    |
| Lead (Pb)      | mg/kg | < 3   | MCERTS        | 22    | 27    | 275   | 23    | 76    |
| Mercury (Hg)   | mg/kg | < 1   | NONE          | < 1   | < 1   | < 1   | < 1   | < 1   |
| Nickel (Ni)    | mg/kg | < 3   | MCERTS        | 21    | 20    | 20    | 28    | 16    |
| Selenium (Se)  | mg/kg | < 3   | NONE          | < 3   | < 3   | < 3   | < 3   | < 3   |
| Vanadium (V)   | mg/kg | < 2   | NONE          | 50    | 35    | 52    | 48    | 35    |
| Zinc (Zn)      | mg/kg | < 3   | MCERTS        | 56    | 49    | 114   | 63    | 88    |

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

| Soil Analysis Certificate             |                 |               |               |               |               |               |
|---------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| QTS Environmental Report No: 15-30721 | Date Sampled    | 16/04/15      | 16/04/15      | 16/04/15      | 16/04/15      | 16/04/15      |
| Soils Ltd                             | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Ranelagh Road         | TP / BH No      | HP6           | HP7           | HP8           | HP9           | HP10          |
| Project / Job Ref: 14933              | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied               | Depth (m)       | 0.20          | 0.20          | 0.25          | 0.30          | 0.40          |
| Reporting Date: 23/04/2015            | QTSE Sample No  | 145340        | 145341        | 145342        | 145343        | 145344        |

| Determinand    | Unit  | RL    | Accreditation |     |       |       |       |       |
|----------------|-------|-------|---------------|-----|-------|-------|-------|-------|
| Arsenic (As)   | mg/kg | < 2   | MCERTS        | 7   | 6     | 4     | 5     | 6     |
| Barium (Ba)    | mg/kg | < 5   | NONE          | 149 | 79    | 58    | 82    | 71    |
| Beryllium (Be) | mg/kg | < 0.5 | NONE          | 0.6 | < 0.5 | < 0.5 | < 0.5 | < 0.5 |
| W/S Boron      | mg/kg | < 1   | NONE          | 1.5 | < 1   | < 1   | < 1   | < 1   |
| Cadmium (Cd)   | mg/kg | < 0.2 | MCERTS        | 0.3 | 0.2   | 0.4   | 0.2   | < 0.2 |
| Chromium (Cr)  | mg/kg | < 2   | MCERTS        | 17  | 25    | 15    | 25    | 30    |
| Copper (Cu)    | mg/kg | < 4   | MCERTS        | 38  | 11    | < 4   | < 4   | < 4   |
| Lead (Pb)      | mg/kg | < 3   | MCERTS        | 131 | 47    | 39    | 47    | 19    |
| Mercury (Hg)   | mg/kg | < 1   | NONE          | < 1 | < 1   | < 1   | < 1   | < 1   |
| Nickel (Ni)    | mg/kg | < 3   | MCERTS        | 21  | 17    | 11    | 16    | 19    |
| Selenium (Se)  | mg/kg | < 3   | NONE          | < 3 | < 3   | < 3   | < 3   | < 3   |
| Vanadium (V)   | mg/kg | < 2   | NONE          | 39  | 41    | 25    | 39    | 47    |
| Zinc (Zn)      | mg/kg | < 3   | MCERTS        | 103 | 68    | 77    | 73    | 55    |

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

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



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| Soil Analysis Certificate - Sample Descriptions |  |
|-------------------------------------------------|--|
| QTS Environmental Report No: 15-30721           |  |
| Soils Ltd                                       |  |
| Site Reference: Ranelagh Road                   |  |
| Project / Job Ref: 14933                        |  |
| Order No: None Supplied                         |  |
| Reporting Date: 23/04/2015                      |  |

| QTSE Sample No | TP / BH No | Additional Refs | Depth (m) | Moisture Content (%) | Sample Matrix Description             |
|----------------|------------|-----------------|-----------|----------------------|---------------------------------------|
| 145335         | HP1        | None Supplied   | 0.10      | 17.8                 | Brown clay                            |
| 145336         | HP2        | None Supplied   | 0.30      | 16.6                 | Brown clay with stones                |
| 145337         | HP3        | None Supplied   | 0.30      | 16.7                 | Brown clay                            |
| 145338         | HP4        | None Supplied   | 0.50      | 15.4                 | Brown clay                            |
| 145339         | HP5        | None Supplied   | 0.50      | 17.2                 | Brown clay with rubble                |
| 145340         | HP6        | None Supplied   | 0.20      | 19                   | Brown clay with rubble and vegetation |
| 145341         | HP7        | None Supplied   | 0.20      | 14.7                 | Brown clay                            |
| 145342         | HP8        | None Supplied   | 0.25      | 18.8                 | Brown clay with chalk                 |
| 145343         | HP9        | None Supplied   | 0.30      | 18.6                 | Brown clay with vegetation            |
| 145344         | HP10       | None Supplied   | 0.40      | 17.6                 | Brown clay                            |

Moisture content is part of procedure E003 & is not an accredited test  
Insufficient Sample <sup>1/S</sup>  
Unsuitable Sample <sup>U/S</sup>



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| Soil Analysis Certificate - Methodology & Miscellaneous Information |  |  |  |  |
|---------------------------------------------------------------------|--|--|--|--|
| QTS Environmental Report No: 15-30721                               |  |  |  |  |
| Soils Ltd                                                           |  |  |  |  |
| Site Reference: Ranelagh Road                                       |  |  |  |  |
| Project / Job Ref: 14933                                            |  |  |  |  |
| Order No: None Supplied                                             |  |  |  |  |
| Reporting Date: 23/04/2015                                          |  |  |  |  |

| 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**



Craig Morrison  
Soils Ltd  
Newton House  
Cross Road  
Tadworth  
Surrey  
KT20 5SR



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## **QTS Environmental Report No: 14-26749**

**Site Reference:** Ranelagh Road

**Project / Job Ref:** 14639

**Order No:** None Supplied

**Sample Receipt Date:** 21/11/2014

**Sample Scheduled Date:** 21/11/2014

**Report Issue Number:** 1

**Reporting Date:** 26/11/2014

**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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Tel : 01622 850410



| Soil Analysis Certificate             |                 |               |               |               |               |               |
|---------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| QTS Environmental Report No: 14-26749 | Date Sampled    | 18/11/14      | 18/11/14      | 18/11/14      | 18/11/14      | 18/11/14      |
| Soils Ltd                             | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Ranelagh Road         | TP / BH No      | TP101         | TP102         | TP103         | TP104         | TP105         |
| Project / Job Ref: 14639              | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied               | Depth (m)       | 0.25          | 0.50          | 0.50          | 0.25          | 0.25          |
| Reporting Date: 26/11/2014            | QTSE Sample No  | 126538        | 126539        | 126540        | 126541        | 126542        |

| Determinand                | Unit     | RL     | Accreditation |              |              |              |              |              |
|----------------------------|----------|--------|---------------|--------------|--------------|--------------|--------------|--------------|
| Asbestos Screen            | N/a      | N/a    | ISO17025      | Not Detected | Not Detected | Not Detected | Not Detected | Not Detected |
| pH                         | pH Units | N/a    | MCERTS        | 6.9          | 7.0          | 7.5          | 7.5          | 7.8          |
| Total Cyanide              | mg/kg    | < 2    | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| W/S Sulphate as SO4 (2:1)  | g/l      | < 0.01 | MCERTS        | 0.03         | 0.04         | 0.03         | 0.02         | 0.02         |
| Sulphide                   | mg/kg    | < 5    | NONE          | < 5          | < 5          | < 5          | < 5          | < 5          |
| Organic Matter             | %        | < 0.1  | NONE          | 1.4          | 0.4          | 0.2          | 4.1          | 1            |
| Total Organic Carbon (TOC) | %        | < 0.1  | NONE          | 0.8          | 0.2          | < 0.1        | 2.4          | 0.6          |
| Arsenic (As)               | mg/kg    | < 2    | MCERTS        | 5            | 5            | 4            | 4            | 7            |
| Beryllium (Be)             | mg/kg    | < 0.5  | NONE          | < 0.5        | 0.6          | 0.5          | < 0.5        | < 0.5        |
| W/S Boron                  | mg/kg    | < 1    | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Cadmium (Cd)               | mg/kg    | < 0.5  | MCERTS        | < 0.5        | < 0.5        | < 0.5        | < 0.5        | < 0.5        |
| Chromium (Cr)              | mg/kg    | < 2    | MCERTS        | 24           | 23           | 22           | 21           | 23           |
| Chromium (hexavalent)      | mg/kg    | < 2    | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| Copper (Cu)                | mg/kg    | < 4    | MCERTS        | 29           | 14           | 9            | 11           | 27           |
| Lead (Pb)                  | mg/kg    | < 3    | MCERTS        | 40           | 22           | 10           | 48           | 194          |
| Mercury (Hg)               | mg/kg    | < 1    | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Nickel (Ni)                | mg/kg    | < 3    | MCERTS        | 17           | 21           | 23           | 10           | 16           |
| Selenium (Se)              | mg/kg    | < 3    | NONE          | < 3          | < 3          | < 3          | < 3          | < 3          |
| Vanadium (V)               | mg/kg    | < 2    | NONE          | 38           | 32           | 31           | 33           | 37           |
| Zinc (Zn)                  | mg/kg    | < 3    | MCERTS        | 64           | 50           | 45           | 109          | 73           |
| 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 <sup>(5)</sup>



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| Soil Analysis Certificate             |                 |               |               |               |               |  |
|---------------------------------------|-----------------|---------------|---------------|---------------|---------------|--|
| QTS Environmental Report No: 14-26749 | Date Sampled    | 18/11/14      | 18/11/14      | 18/11/14      | 18/11/14      |  |
| Soils Ltd                             | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied |  |
| Site Reference: Ranelagh Road         | TP / BH No      | TP106         | TP108         | TP109         | TP110         |  |
| Project / Job Ref: 14639              | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied |  |
| Order No: None Supplied               | Depth (m)       | 0.25          | 0.25          | 0.25          | 0.25          |  |
| Reporting Date: 26/11/2014            | QTSE Sample No  | 126543        | 126544        | 126545        | 126546        |  |

| Determinand                | Unit     | RL     | Accreditation |              |              |              |              |  |
|----------------------------|----------|--------|---------------|--------------|--------------|--------------|--------------|--|
| Asbestos Screen            | N/a      | N/a    | ISO17025      | Not Detected | Not Detected | Not Detected | Not Detected |  |
| pH                         | pH Units | N/a    | MCERTS        | 7.0          | 7.2          | 7.5          | 7.2          |  |
| Total Cyanide              | mg/kg    | < 2    | NONE          | < 2          | < 2          | < 2          | < 2          |  |
| W/S Sulphate as SO4 (2:1)  | g/l      | < 0.01 | MCERTS        | 0.01         | 0.01         | 0.03         | 0.04         |  |
| Sulphide                   | mg/kg    | < 5    | NONE          | < 5          | < 5          | < 5          | < 5          |  |
| Organic Matter             | %        | < 0.1  | NONE          | 6.5          | 1.4          | 2.1          | 3.6          |  |
| Total Organic Carbon (TOC) | %        | < 0.1  | NONE          | 3.8          | 0.8          | 1.2          | 2.1          |  |
| Arsenic (As)               | mg/kg    | < 2    | MCERTS        | 10           | 6            | 7            | 9            |  |
| Beryllium (Be)             | mg/kg    | < 0.5  | NONE          | 0.7          | < 0.5        | 0.5          | 0.6          |  |
| W/S Boron                  | mg/kg    | < 1    | NONE          | 1.5          | 1.5          | < 1          | 2.1          |  |
| Cadmium (Cd)               | mg/kg    | < 0.5  | MCERTS        | 0.8          | < 0.5        | < 0.5        | < 0.5        |  |
| Chromium (Cr)              | mg/kg    | < 2    | MCERTS        | 27           | 23           | 19           | 20           |  |
| Chromium (hexavalent)      | mg/kg    | < 2    | NONE          | < 2          | < 2          | < 2          | < 2          |  |
| Copper (Cu)                | mg/kg    | < 4    | MCERTS        | 40           | 13           | 26           | 35           |  |
| Lead (Pb)                  | mg/kg    | < 3    | MCERTS        | 104          | 27           | 97           | 118          |  |
| Mercury (Hg)               | mg/kg    | < 1    | NONE          | 1.4          | < 1          | < 1          | < 1          |  |
| Nickel (Ni)                | mg/kg    | < 3    | MCERTS        | 19           | 15           | 17           | 17           |  |
| Selenium (Se)              | mg/kg    | < 3    | NONE          | < 3          | < 3          | < 3          | < 3          |  |
| Vanadium (V)               | mg/kg    | < 2    | NONE          | 40           | 37           | 39           | 41           |  |
| Zinc (Zn)                  | mg/kg    | < 3    | MCERTS        | 206          | 65           | 58           | 104          |  |
| Total Phenols (monohydric) | mg/kg    | < 2    | NONE          | < 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 <sup>(5)</sup>



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| Soil Analysis Certificate - Speciated PAHs |                 |               |               |               |               |               |
|--------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| QTS Environmental Report No: 14-26749      | Date Sampled    | 18/11/14      | 18/11/14      | 18/11/14      | 18/11/14      | 18/11/14      |
| Soils Ltd                                  | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Ranelagh Road              | TP / BH No      | TP101         | TP102         | TP103         | TP104         | TP105         |
| Project / Job Ref: 14639                   | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                    | Depth (m)       | 0.25          | 0.50          | 0.50          | 0.25          | 0.25          |
| Reporting Date: 26/11/2014                 | QTSE Sample No  | 126538        | 126539        | 126540        | 126541        | 126542        |

| 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 | 0.27  | < 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 | < 0.1 | < 0.1 | 0.92  | < 0.1 |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.84  | < 0.1 |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.42  | < 0.1 |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.48  | < 0.1 |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.60  | < 0.1 |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.20  | < 0.1 |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.42  | < 0.1 |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.27  | < 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 | 0.27  | < 0.1 |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | < 1.6 | < 1.6 | < 1.6 | 4.7   | < 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 - Speciated PAHs |                 |               |               |               |               |  |
|--------------------------------------------|-----------------|---------------|---------------|---------------|---------------|--|
| QTS Environmental Report No: 14-26749      | Date Sampled    | 18/11/14      | 18/11/14      | 18/11/14      | 18/11/14      |  |
| Soils Ltd                                  | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied |  |
| Site Reference: Ranelagh Road              | TP / BH No      | TP106         | TP108         | TP109         | TP110         |  |
| Project / Job Ref: 14639                   | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied |  |
| Order No: None Supplied                    | Depth (m)       | 0.25          | 0.25          | 0.25          | 0.25          |  |
| Reporting Date: 26/11/2014                 | QTSE Sample No  | 126543        | 126544        | 126545        | 126546        |  |

| Determinand            | Unit  | RL    | Accreditation |       |       |       |       |  |
|------------------------|-------|-------|---------------|-------|-------|-------|-------|--|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |  |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |  |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |  |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |  |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.24  |  |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |  |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.13  | 0.42  |  |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.13  | 0.34  |  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.16  |  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.22  |  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.28  |  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | 0.17  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | < 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 |  |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |  |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | < 1.6 | < 1.6 | < 1.6 | 1.8   |  |

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: 14-26749      | Date Sampled    | 18/11/14      | 18/11/14      | 18/11/14      | 18/11/14      | 18/11/14      |
| Soils Ltd                                  | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Ranelagh Road              | TP / BH No      | TP102         | TP104         | TP105         | TP106         | TP108         |
| Project / Job Ref: 14639                   | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                    | Depth (m)       | 0.50          | 0.25          | 0.25          | 0.25          | 0.25          |
| Reporting Date: 26/11/2014                 | QTSE Sample No  | 126539        | 126541        | 126542        | 126543        | 126544        |

| 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 | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aliphatic >C10 - C12 | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aliphatic >C12 - C16 | mg/kg | < 3    | MCERTS        | < 3    | < 3    | < 3    | < 3    | < 3    |
| Aliphatic >C16 - C21 | mg/kg | < 3    | MCERTS        | < 3    | < 3    | < 3    | < 3    | < 3    |
| Aliphatic >C21 - C34 | mg/kg | < 10   | MCERTS        | < 10   | < 10   | < 10   | < 10   | < 10   |
| Aliphatic (C5 - C34) | mg/kg | < 21   | NONE          | < 21   | < 21   | < 21   | < 21   | < 21   |
| 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 | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C10 - C12  | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C12 - C16  | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C16 - C21  | mg/kg | < 3    | MCERTS        | < 3    | 3      | < 3    | 4      | < 3    |
| Aromatic >C21 - C35  | mg/kg | < 10   | MCERTS        | < 10   | < 10   | < 10   | 21     | < 10   |
| Aromatic (C5 - C35)  | mg/kg | < 21   | NONE          | < 21   | < 21   | < 21   | 25     | < 21   |
| Total >C5 - C35      | mg/kg | < 42   | NONE          | < 42   | < 42   | < 42   | < 42   | < 42   |

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: 14-26749      | Date Sampled    | 18/11/14      |  |  |  |  |
| Soils Ltd                                  | Time Sampled    | None Supplied |  |  |  |  |
| Site Reference: Ranelagh Road              | TP / BH No      | TP110         |  |  |  |  |
| Project / Job Ref: 14639                   | Additional Refs | None Supplied |  |  |  |  |
| Order No: None Supplied                    | Depth (m)       | 0.25          |  |  |  |  |
| Reporting Date: 26/11/2014                 | QTSE Sample No  | 126546        |  |  |  |  |

| Determinand          | Unit  | RL     | Accreditation |        |  |  |  |
|----------------------|-------|--------|---------------|--------|--|--|--|
| Aliphatic >C5 - C6   | mg/kg | < 0.01 | NONE          | < 0.01 |  |  |  |
| Aliphatic >C6 - C8   | mg/kg | < 0.05 | NONE          | < 0.05 |  |  |  |
| Aliphatic >C8 - C10  | mg/kg | < 2    | MCERTS        | < 2    |  |  |  |
| Aliphatic >C10 - C12 | mg/kg | < 2    | MCERTS        | < 2    |  |  |  |
| Aliphatic >C12 - C16 | mg/kg | < 3    | MCERTS        | < 3    |  |  |  |
| Aliphatic >C16 - C21 | mg/kg | < 3    | MCERTS        | < 3    |  |  |  |
| Aliphatic >C21 - C34 | mg/kg | < 10   | MCERTS        | < 10   |  |  |  |
| Aliphatic (C5 - C34) | mg/kg | < 21   | NONE          | < 21   |  |  |  |
| Aromatic >C5 - C7    | mg/kg | < 0.01 | NONE          | < 0.01 |  |  |  |
| Aromatic >C7 - C8    | mg/kg | < 0.05 | NONE          | < 0.05 |  |  |  |
| Aromatic >C8 - C10   | mg/kg | < 2    | MCERTS        | < 2    |  |  |  |
| Aromatic >C10 - C12  | mg/kg | < 2    | MCERTS        | < 2    |  |  |  |
| Aromatic >C12 - C16  | mg/kg | < 2    | MCERTS        | < 2    |  |  |  |
| Aromatic >C16 - C21  | mg/kg | < 3    | MCERTS        | < 3    |  |  |  |
| Aromatic >C21 - C35  | mg/kg | < 10   | MCERTS        | < 10   |  |  |  |
| Aromatic (C5 - C35)  | mg/kg | < 21   | NONE          | < 21   |  |  |  |
| Total >C5 - C35      | mg/kg | < 42   | NONE          | < 42   |  |  |  |

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 - BTEX / MTBE |                 |               |               |               |               |               |
|-----------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| QTS Environmental Report No: 14-26749   | Date Sampled    | 18/11/14      | 18/11/14      | 18/11/14      | 18/11/14      | 18/11/14      |
| Soils Ltd                               | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Ranelagh Road           | TP / BH No      | TP102         | TP104         | TP105         | TP106         | TP108         |
| Project / Job Ref: 14639                | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: None Supplied                 | Depth (m)       | 0.50          | 0.25          | 0.25          | 0.25          | 0.25          |
| Reporting Date: 26/11/2014              | QTSE Sample No  | 126539        | 126541        | 126542        | 126543        | 126544        |

| 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 |
| MTBE         | ug/kg | < 5  | MCERTS        | < 5  | < 5  | < 5  | < 5  | < 5  |

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



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| Soil Analysis Certificate - BTEX / MTBE |                 |               |  |  |  |  |
|-----------------------------------------|-----------------|---------------|--|--|--|--|
| QTS Environmental Report No: 14-26749   | Date Sampled    | 18/11/14      |  |  |  |  |
| Soils Ltd                               | Time Sampled    | None Supplied |  |  |  |  |
| Site Reference: Ranelagh Road           | TP / BH No      | TP110         |  |  |  |  |
| Project / Job Ref: 14639                | Additional Refs | None Supplied |  |  |  |  |
| Order No: None Supplied                 | Depth (m)       | 0.25          |  |  |  |  |
| Reporting Date: 26/11/2014              | QTSE Sample No  | 126546        |  |  |  |  |

| Determinand  | Unit  | RL   | Accreditation |      |  |  |  |
|--------------|-------|------|---------------|------|--|--|--|
| Benzene      | ug/kg | < 2  | MCERTS        | < 2  |  |  |  |
| Toluene      | ug/kg | < 5  | MCERTS        | < 5  |  |  |  |
| Ethylbenzene | ug/kg | < 10 | MCERTS        | < 10 |  |  |  |
| p & m-xylene | ug/kg | < 10 | MCERTS        | < 10 |  |  |  |
| o-xylene     | ug/kg | < 10 | MCERTS        | < 10 |  |  |  |
| MTBE         | 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 - Sample Descriptions |  |
|-------------------------------------------------|--|
| QTS Environmental Report No: 14-26749           |  |
| Soils Ltd                                       |  |
| Site Reference: Ranelagh Road                   |  |
| Project / Job Ref: 14639                        |  |
| Order No: None Supplied                         |  |
| Reporting Date: 26/11/2014                      |  |

| QTSE Sample No | TP / BH No | Additional Refs | Depth (m) | Moisture Content (%) | Sample Matrix Description        |
|----------------|------------|-----------------|-----------|----------------------|----------------------------------|
| 126538         | TP101      | None Supplied   | 0.25      | 17.2                 | Brown loamy clay with vegetation |
| 126539         | TP102      | None Supplied   | 0.50      | 12                   | Brown gravelly clay with stones  |
| 126540         | TP103      | None Supplied   | 0.50      | 13.6                 | Brown gravelly clay with stones  |
| 126541         | TP104      | None Supplied   | 0.25      | 16.9                 | Brown loamy clay with brick      |
| 126542         | TP105      | None Supplied   | 0.25      | 18.7                 | Brown loamy clay with brick      |
| 126543         | TP106      | None Supplied   | 0.25      | 31.6                 | Brown loamy clay with vegetation |
| 126544         | TP108      | None Supplied   | 0.25      | 19                   | Brown clayey loam                |
| 126545         | TP109      | None Supplied   | 0.25      | 21.4                 | Brown gravelly clay with rubble  |
| 126546         | TP110      | None Supplied   | 0.25      | 19.7                 | Brown sandy clay with stones     |

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

Insufficient Sample <sup>U/S</sup>

Unsuitable Sample <sup>U/S</sup>



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| Soil Analysis Certificate - Methodology & Miscellaneous Information |  |  |  |  |
|---------------------------------------------------------------------|--|--|--|--|
| QTS Environmental Report No: 14-26749                               |  |  |  |  |
| Soils Ltd                                                           |  |  |  |  |
| Site Reference: Ranelagh Road                                       |  |  |  |  |
| Project / Job Ref: 14639                                            |  |  |  |  |
| Order No: None Supplied                                             |  |  |  |  |
| Reporting Date: 26/11/2014                                          |  |  |  |  |

| 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**



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## **QTS Environmental Report No: 14-19431**

**Site Reference:** Ranelagh Road, Havant

**Project / Job Ref:** 14099

**Order No:** None Supplied

**Sample Receipt Date:** 13/02/2014

**Sample Scheduled Date:** 13/02/2014

**Report Issue Number:** 1

**Reporting Date:** 19/02/2014

**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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| Soil Analysis Certificate                    |                        |               |               |               |               |
|----------------------------------------------|------------------------|---------------|---------------|---------------|---------------|
| <b>QTS Environmental Report No: 14-19431</b> | <b>Date Sampled</b>    | 12/02/14      | 12/02/14      | 12/02/14      | 12/02/14      |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Ranelagh Road, Havant</b> | <b>TP / BH No</b>      | WS5           | WS7           | WS8           | WS9           |
| <b>Project / Job Ref: 14099</b>              | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.60          | 0.40          | 0.40          | 0.60          |
| <b>Reporting Date: 19/02/2014</b>            | <b>QTSE Sample No</b>  | 93687         | 93688         | 93689         | 93690         |

| Determinand                           | Unit     | RL     | Accreditation |              |              |              |              |
|---------------------------------------|----------|--------|---------------|--------------|--------------|--------------|--------------|
| Asbestos Screen <sup>(S)</sup>        | N/a      | N/a    | ISO17025      | Not Detected | Not Detected | Not Detected | Not Detected |
| pH                                    | pH Units | N/a    | MCERTS        | 8.1          | 8.1          | 8.1          | 9.6          |
| Total Cyanide                         | mg/kg    | < 2    | NONE          | < 2          | < 2          | < 2          | < 2          |
| W/S Sulphate as SO <sub>4</sub> (2:1) | g/l      | < 0.01 | NONE          | 0.02         | 0.07         | 0.10         | < 0.01       |
| Sulphide                              | mg/kg    | < 5    | NONE          | < 5          | < 5          | < 5          | < 5          |
| Organic Matter                        | %        | < 0.1  | NONE          | < 0.1        | 1            | 2.9          | < 0.1        |
| Total Organic Carbon (TOC)            | %        | < 0.1  | NONE          | < 0.1        | 0.6          | 1.7          | < 0.1        |
| Arsenic (As)                          | mg/kg    | < 2    | MCERTS        | 4            | 9            | 12           | 5            |
| Beryllium (Be)                        | mg/kg    | < 0.5  | NONE          | < 0.5        | 0.6          | < 0.5        | < 0.5        |
| W/S Boron                             | mg/kg    | < 1    | NONE          | < 1          | < 1          | 2.7          | < 1          |
| Cadmium (Cd)                          | mg/kg    | < 0.5  | MCERTS        | < 0.5        | < 0.5        | < 0.5        | < 0.5        |
| Chromium (Cr)                         | mg/kg    | < 2    | MCERTS        | 28           | 16           | 18           | 8            |
| Chromium (hexavalent)                 | mg/kg    | < 2    | NONE          | < 2          | < 2          | < 2          | < 2          |
| Copper (Cu)                           | mg/kg    | < 4    | MCERTS        | 13           | 31           | 30           | 15           |
| Lead (Pb)                             | mg/kg    | < 3    | MCERTS        | 13           | 27           | 385          | 58           |
| Mercury (Hg)                          | mg/kg    | < 1    | NONE          | < 1          | < 1          | 3.9          | < 1          |
| Nickel (Ni)                           | mg/kg    | < 3    | MCERTS        | 20           | 25           | 15           | 6            |
| Selenium (Se)                         | mg/kg    | < 3    | NONE          | < 3          | < 3          | < 3          | < 3          |
| Vanadium (V)                          | mg/kg    | < 2    | NONE          | 43           | 34           | 35           | 16           |
| Zinc (Zn)                             | mg/kg    | < 3    | MCERTS        | 48           | 73           | 75           | 31           |
| Total Phenols (monohydric)            | mg/kg    | < 2    | NONE          | < 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

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



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# Soil Analysis Certificate - Speciated PAHs

|                                              |                        |               |               |               |               |
|----------------------------------------------|------------------------|---------------|---------------|---------------|---------------|
| <b>QTS Environmental Report No: 14-19431</b> | <b>Date Sampled</b>    | 12/02/14      | 12/02/14      | 12/02/14      | 12/02/14      |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Ranelagh Road, Havant</b> | <b>TP / BH No</b>      | WS5           | WS7           | WS8           | WS9           |
| <b>Project / Job Ref: 14099</b>              | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.60          | 0.40          | 0.40          | 0.60          |
| <b>Reporting Date: 19/02/2014</b>            | <b>QTSE Sample No</b>  | 93687         | 93688         | 93689         | 93690         |

| Determinand            | Unit  | RL    | Accreditation |       |       |       |       |
|------------------------|-------|-------|---------------|-------|-------|-------|-------|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.28  | < 0.1 |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.23  | < 0.1 |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.14  | < 0.1 |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.17  | < 0.1 |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.17  | < 0.1 |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | < 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 |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | < 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 |

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**

|                                              |                        |               |  |  |  |  |
|----------------------------------------------|------------------------|---------------|--|--|--|--|
| <b>QTS Environmental Report No: 14-19431</b> | <b>Date Sampled</b>    | 12/02/14      |  |  |  |  |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied |  |  |  |  |
| <b>Site Reference: Ranelagh Road, Havant</b> | <b>TP / BH No</b>      | WS8           |  |  |  |  |
| <b>Project / Job Ref: 14099</b>              | <b>Additional Refs</b> | None Supplied |  |  |  |  |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.40          |  |  |  |  |
| <b>Reporting Date: 19/02/2014</b>            | <b>QTSE Sample No</b>  | 93689         |  |  |  |  |

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

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



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**Kent ME17 2JN**  
**Tel : 01622 850410**



| Soil Analysis Certificate - BTEX / MTBE |                 |               |  |  |  |  |
|-----------------------------------------|-----------------|---------------|--|--|--|--|
| QTS Environmental Report No: 14-19431   | Date Sampled    | 12/02/14      |  |  |  |  |
| Soils Ltd                               | Time Sampled    | None Supplied |  |  |  |  |
| Site Reference: Ranelagh Road, Havant   | TP / BH No      | WS8           |  |  |  |  |
| Project / Job Ref: 14099                | Additional Refs | None Supplied |  |  |  |  |
| Order No: None Supplied                 | Depth (m)       | 0.40          |  |  |  |  |
| Reporting Date: 19/02/2014              | QTSE Sample No  | 93689         |  |  |  |  |

| Determinand  | Unit  | RL   | Accreditation |      |  |  |  |
|--------------|-------|------|---------------|------|--|--|--|
| Benzene      | ug/kg | < 2  | MCERTS        | < 2  |  |  |  |
| Toluene      | ug/kg | < 5  | MCERTS        | < 5  |  |  |  |
| Ethylbenzene | ug/kg | < 10 | MCERTS        | < 10 |  |  |  |
| p & m-xylene | ug/kg | < 10 | MCERTS        | < 10 |  |  |  |
| o-xylene     | ug/kg | < 10 | MCERTS        | < 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 - Sample Descriptions

QTS Environmental Report No: 14-19431

Soils Ltd

Site Reference: Ranelagh Road, Havant

Project / Job Ref: 14099

Order No: None Supplied

Reporting Date: 19/02/2014

| QTSE Sample No | TP / BH No | Additional Refs | Depth (m) | Moisture Content (%) | Sample Matrix Description       |
|----------------|------------|-----------------|-----------|----------------------|---------------------------------|
| 93687          | WS5        | None Supplied   | 0.60      | 18.1                 | Light brown clay                |
| 93688          | WS7        | None Supplied   | 0.40      | 11.6                 | Brown clayey gravel with stones |
| 93689          | WS8        | None Supplied   | 0.40      | 19.8                 | Brown clayey loam with rubble   |
| 93690          | WS9        | None Supplied   | 0.60      | 18.2                 | Brown clayey loam with chalk    |

Insufficient sample <sup>1/5</sup>

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



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| Soil Analysis Certificate - Methodology & Miscellaneous Information |  |
|---------------------------------------------------------------------|--|
| QTS Environmental Report No: 14-19431                               |  |
| Soils Ltd                                                           |  |
| Site Reference: Ranelagh Road, Havant                               |  |
| Project / Job Ref: 14099                                            |  |
| Order No: None Supplied                                             |  |
| Reporting Date: 19/02/2014                                          |  |

| 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 dphenylcarbazide 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 @ 450°C                | 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      |

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

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



Craig Morrison  
Soils Ltd  
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## **QTS Environmental Report No: 12-11610**

**Site Reference:** Ranelagh Road, Havant

**Project / Job Ref:** 13284

**Order No:** None Supplied

**Sample Receipt Date:** 01/11/2012

**Sample Scheduled Date:** 01/11/2012

**Report Issue Number:** 1

**Reporting Date:** 08/11/2012

**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**  
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| Soil Analysis Certificate                    |                        |               |               |               |               |
|----------------------------------------------|------------------------|---------------|---------------|---------------|---------------|
| <b>QTS Environmental Report No: 12-11610</b> | <b>Date Sampled</b>    | 30/10/12      | 30/10/12      | 30/10/12      | 30/10/12      |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Ranelagh Road, Havant</b> | <b>TP / BH No</b>      | WS1           | WS2           | WS3           | WS4           |
| <b>Project / Job Ref: 13284</b>              | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.10          | 0.30          | 0.10          | 0.40          |
| <b>Reporting Date: 08/11/2012</b>            | <b>QTSE Sample No</b>  | 54862         | 54863         | 54864         | 54865         |

| Determinand                           | Unit     | MDL    | Accreditation |          |          |          |          |          |
|---------------------------------------|----------|--------|---------------|----------|----------|----------|----------|----------|
| Fibrous Material Screen               | P/A      | N / a  | NONE          | Negative | Negative | Negative | Negative | Negative |
| pH                                    | pH Units | N / a  | MCERTS        | 7.8      | 7.3      | 6.0      | 7.0      | 7.1      |
| Total Cyanide                         | mg/kg    | < 2    | NONE          | < 2      | < 2      | < 2      | < 2      | < 2      |
| W/S Sulphate as SO <sub>4</sub> (2:1) | g/l      | < 0.01 | NONE          | 0.10     | 0.03     | 0.03     | 0.01     | < 0.01   |
| Sulphide                              | mg/kg    | < 5    | NONE          | 12       | < 5      | < 5      | < 5      | < 5      |
| Organic Matter                        | %        | < 0.1  | NONE          | 4.5      | 4.7      | 6.7      | 1.2      | 11.5     |
| Total Organic Carbon (TOC)            | %        | < 0.1  | NONE          | 2.6      | 2.7      | 3.9      | 0.7      | 6.7      |
| Arsenic (As)                          | mg/kg    | < 2    | MCERTS        | 10       | 14       | 7        | 10       | 7        |
| Beryllium (Be)                        | mg/kg    | < 0.5  | NONE          | < 0.5    | < 0.5    | < 0.5    | 0.6      | < 0.5    |
| W/S Boron                             | mg/kg    | < 1    | NONE          | < 1      | 1.8      | 1.1      | 1.3      | 1.8      |
| Cadmium (Cd)                          | mg/kg    | < 0.5  | MCERTS        | < 0.5    | < 0.5    | < 0.5    | < 0.5    | < 0.5    |
| Chromium (Cr)                         | mg/kg    | < 2    | MCERTS        | 16       | 21       | 27       | 28       | 32       |
| Chromium (hexavalent)                 | mg/kg    | < 2    | NONE          | < 2      | < 2      | < 2      | < 2      | < 2      |
| Copper (Cu)                           | mg/kg    | < 4    | MCERTS        | 43       | 36       | 37       | 47       | 15       |
| Lead (Pb)                             | mg/kg    | < 3    | MCERTS        | 84       | 290      | 96       | 195      | 18       |
| Mercury (Hg)                          | mg/kg    | < 1    | NONE          | < 1      | < 1      | < 1      | < 1      | < 1      |
| Nickel (Ni)                           | mg/kg    | < 3    | MCERTS        | 13       | 18       | 20       | 21       | 21       |
| Selenium (Se)                         | mg/kg    | < 3    | NONE          | < 3      | < 3      | < 3      | < 3      | < 3      |
| Vanadium (V)                          | mg/kg    | < 2    | NONE          | 31       | 36       | 51       | 48       | 47       |
| Zinc (Zn)                             | mg/kg    | < 3    | MCERTS        | 83       | 194      | 139      | 274      | 56       |
| 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

Stone content is classified as material greater than 10mm in diameter

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



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# Soil Analysis Certificate

|                                              |                        |               |               |               |  |  |
|----------------------------------------------|------------------------|---------------|---------------|---------------|--|--|
| <b>QTS Environmental Report No: 12-11610</b> | <b>Date Sampled</b>    | 26/10/12      | 26/10/12      | 26/10/12      |  |  |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied |  |  |
| <b>Site Reference: Ranelagh Road, Havant</b> | <b>TP / BH No</b>      | S1            | TP2           | TP3           |  |  |
| <b>Project / Job Ref: 13284</b>              | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied |  |  |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.40          | 0.50          | 0.40          |  |  |
| <b>Reporting Date: 08/11/2012</b>            | <b>QTSE Sample No</b>  | 54867         | 54869         | 54870         |  |  |

| Determinand                           | Unit     | MDL    | Accreditation |          |          |          |  |  |
|---------------------------------------|----------|--------|---------------|----------|----------|----------|--|--|
| Fibrous Material Screen               | P/A      | N / a  | NONE          | Negative | Negative | Negative |  |  |
| pH                                    | pH Units | N / a  | MCERTS        | 7.2      | 7.8      | 7.1      |  |  |
| Total Cyanide                         | mg/kg    | < 2    | NONE          | < 2      | < 2      | < 2      |  |  |
| W/S Sulphate as SO <sub>4</sub> (2:1) | g/l      | < 0.01 | NONE          | 0.02     | 0.02     | 0.02     |  |  |
| Sulphide                              | mg/kg    | < 5    | NONE          | < 5      | < 5      | < 5      |  |  |
| Organic Matter                        | %        | < 0.1  | NONE          | 8.9      | 5.7      | 5.9      |  |  |
| Total Organic Carbon (TOC)            | %        | < 0.1  | NONE          | 5.2      | 3.3      | 3.4      |  |  |
| Arsenic (As)                          | mg/kg    | < 2    | MCERTS        | 10       | 11       | 8        |  |  |
| Beryllium (Be)                        | mg/kg    | < 0.5  | NONE          | < 0.5    | 0.6      | < 0.5    |  |  |
| W/S Boron                             | mg/kg    | < 1    | NONE          | 2.1      | 2        | 1.4      |  |  |
| Cadmium (Cd)                          | mg/kg    | < 0.5  | MCERTS        | < 0.5    | < 0.5    | < 0.5    |  |  |
| Chromium (Cr)                         | mg/kg    | < 2    | MCERTS        | 24       | 23       | 24       |  |  |
| Chromium (hexavalent)                 | mg/kg    | < 2    | NONE          | < 2      | < 2      | < 2      |  |  |
| Copper (Cu)                           | mg/kg    | < 4    | MCERTS        | 44       | 57       | 35       |  |  |
| Lead (Pb)                             | mg/kg    | < 3    | MCERTS        | 198      | 223      | 129      |  |  |
| Mercury (Hg)                          | mg/kg    | < 1    | NONE          | 1.1      | < 1      | < 1      |  |  |
| Nickel (Ni)                           | mg/kg    | < 3    | MCERTS        | 19       | 22       | 18       |  |  |
| Selenium (Se)                         | mg/kg    | < 3    | NONE          | < 3      | < 3      | < 3      |  |  |
| Vanadium (V)                          | mg/kg    | < 2    | NONE          | 35       | 45       | 47       |  |  |
| Zinc (Zn)                             | mg/kg    | < 3    | MCERTS        | 226      | 166      | 104      |  |  |
| Total Phenols (monohydric)            | mg/kg    | < 2    | NONE          | < 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

Stone content is classified as material greater than 10mm in diameter

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



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| Soil Analysis Certificate - Speciated PAHs   |                        |               |               |               |               |               |
|----------------------------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>QTS Environmental Report No: 12-11610</b> | <b>Date Sampled</b>    | 30/10/12      | 30/10/12      | 30/10/12      | 30/10/12      | 30/10/12      |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Ranelagh Road, Havant</b> | <b>TP / BH No</b>      | WS1           | WS2           | WS3           | WS4           | WS4           |
| <b>Project / Job Ref: 13284</b>              | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.10          | 0.30          | 0.10          | 0.10          | 0.40          |
| <b>Reporting Date: 08/11/2012</b>            | <b>QTSE Sample No</b>  | 54862         | 54863         | 54864         | 54865         | 54866         |

| Determinand            | Unit  | MDL   | Accreditation |       |       |       |       |       |
|------------------------|-------|-------|---------------|-------|-------|-------|-------|-------|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | 0.16  | 0.21  | < 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        | 0.20  | 1.04  | 0.17  | < 0.1 | < 0.1 |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | 0.15  | 0.95  | 0.15  | < 0.1 | < 0.1 |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.40  | < 0.1 | < 0.1 | < 0.1 |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.64  | 0.12  | < 0.1 | < 0.1 |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.67  | < 0.1 | < 0.1 | < 0.1 |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.32  | < 0.1 | < 0.1 | < 0.1 |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.44  | < 0.1 | < 0.1 | < 0.1 |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.30  | < 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 | 0.24  | < 0.1 | < 0.1 | < 0.1 |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | < 1.6 | 5.2   | < 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 - Speciated PAHs   |                        |               |               |               |  |  |
|----------------------------------------------|------------------------|---------------|---------------|---------------|--|--|
| <b>QTS Environmental Report No: 12-11610</b> | <b>Date Sampled</b>    | 26/10/12      | 26/10/12      | 26/10/12      |  |  |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied |  |  |
| <b>Site Reference: Ranelagh Road, Havant</b> | <b>TP / BH No</b>      | S1            | TP2           | TP3           |  |  |
| <b>Project / Job Ref: 13284</b>              | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied |  |  |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.40          | 0.50          | 0.40          |  |  |
| <b>Reporting Date: 08/11/2012</b>            | <b>QTSE Sample No</b>  | 54867         | 54869         | 54870         |  |  |

| Determinand            | Unit  | MDL   | 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        | < 0.1 | < 0.1 | 0.12  |  |  |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 |  |  |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | 0.31  | 0.30  | 0.38  |  |  |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | 0.27  | 0.27  | 0.35  |  |  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.14  | 0.16  |  |  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | 0.19  | 0.22  | 0.28  |  |  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.22  | 0.21  | 0.28  |  |  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | 0.12  |  |  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.15  | 0.17  |  |  |
| 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        | < 1.6 | < 1.6 | 1.9   |  |  |

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: 12-11610      |  | Date Sampled    | 30/10/12      | 30/10/12      |  |  |
| Soils Ltd                                  |  | Time Sampled    | None Supplied | None Supplied |  |  |
| Site Reference: Ranelagh Road, Havant      |  | TP / BH No      | WS3           | WS4           |  |  |
| Project / Job Ref: 13284                   |  | Additional Refs | None Supplied | None Supplied |  |  |
| Order No: None Supplied                    |  | Depth (m)       | 0.10          | 0.10          |  |  |
| Reporting Date: 08/11/2012                 |  | QTSE Sample No  | 54864         | 54865         |  |  |

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

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| Soil Analysis Certificate - BTEX / MTBE |                 |               |               |  |  |  |
|-----------------------------------------|-----------------|---------------|---------------|--|--|--|
| QTS Environmental Report No: 12-11610   | Date Sampled    | 30/10/12      | 30/10/12      |  |  |  |
| Soils Ltd                               | Time Sampled    | None Supplied | None Supplied |  |  |  |
| Site Reference: Ranelagh Road, Havant   | TP / BH No      | WS3           | WS4           |  |  |  |
| Project / Job Ref: 13284                | Additional Refs | None Supplied | None Supplied |  |  |  |
| Order No: None Supplied                 | Depth (m)       | 0.10          | 0.10          |  |  |  |
| Reporting Date: 08/11/2012              | QTSE Sample No  | 54864         | 54865         |  |  |  |

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

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



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4480

# **Soil Analysis Certificate - Organochlorine Pesticides**

|                                              |                        |               |  |  |  |  |
|----------------------------------------------|------------------------|---------------|--|--|--|--|
| <b>QTS Environmental Report No: 12-11610</b> | <b>Date Sampled</b>    | 26/10/12      |  |  |  |  |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied |  |  |  |  |
| <b>Site Reference: Ranelagh Road, Havant</b> | <b>TP / BH No</b>      | TP1           |  |  |  |  |
| <b>Project / Job Ref: 13284</b>              | <b>Additional Refs</b> | None Supplied |  |  |  |  |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.20          |  |  |  |  |
| <b>Reporting Date: 08/11/2012</b>            | <b>QTSE Sample No</b>  | 54868         |  |  |  |  |

| Determinand                            | Unit  | MDL    | Accreditation |        |  |  |  |
|----------------------------------------|-------|--------|---------------|--------|--|--|--|
| Aldrin <sup>(S)</sup>                  | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| alpha-HCH <sup>(S)</sup>               | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| beta-HCH <sup>(S)</sup>                | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| cis-chlordane <sup>(S)</sup>           | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| delta-HCH <sup>(S)</sup>               | mg/kg | < 0.02 | NONE          | < 0.02 |  |  |  |
| Dieldrin <sup>(S)</sup>                | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| Endosulfan A <sup>(S)</sup>            | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| Endosulfan B <sup>(S)</sup>            | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| Endrin <sup>(S)</sup>                  | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| gamma-HCH (Lindane) <sup>(S)</sup>     | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| Heptachlor <sup>(S)</sup>              | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| Heptachlor epoxide <sup>(S)</sup>      | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| Hexachlorobenzene (HCB) <sup>(S)</sup> | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| Isodrin <sup>(S)</sup>                 | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| Methoxychlor <sup>(S)</sup>            | mg/kg | < 0.02 | NONE          | < 0.02 |  |  |  |
| o,p' - DDD <sup>(S)</sup>              | mg/kg | < 0.02 | NONE          | < 0.02 |  |  |  |
| o,p' - DDE <sup>(S)</sup>              | mg/kg | < 0.02 | NONE          | < 0.02 |  |  |  |
| o,p' - DDT <sup>(S)</sup>              | mg/kg | < 0.02 | NONE          | < 0.02 |  |  |  |
| p,p' - DDD <sup>(S)</sup>              | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| p,p' - DDE <sup>(S)</sup>              | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| p,p' - DDT <sup>(S)</sup>              | mg/kg | < 0.02 | ISO17025      | < 0.02 |  |  |  |
| trans-chlordane <sup>(S)</sup>         | mg/kg | < 0.02 | NONE          | < 0.02 |  |  |  |
| Trifluralin <sup>(S)</sup>             | mg/kg | < 0.02 | NONE          | < 0.02 |  |  |  |

Analytical results are expressed on a dry weight basis where samples are dried at less than 30 °C  
Subcontracted analysis <sup>(S)</sup>



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**Soil Analysis Certificate - Phenyl Urea Herbicides**

|                                              |                        |               |  |  |  |  |
|----------------------------------------------|------------------------|---------------|--|--|--|--|
| <b>QTS Environmental Report No: 12-11610</b> | <b>Date Sampled</b>    | 26/10/12      |  |  |  |  |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied |  |  |  |  |
| <b>Site Reference: Ranelagh Road, Havant</b> | <b>TP / BH No</b>      | TP1           |  |  |  |  |
| <b>Project / Job Ref: 13284</b>              | <b>Additional Refs</b> | None Supplied |  |  |  |  |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.20          |  |  |  |  |
| <b>Reporting Date: 08/11/2012</b>            | <b>QTSE Sample No</b>  | 54868         |  |  |  |  |

| <b>Determinand</b>                | <b>Unit</b> | <b>MDL</b> | <b>Accreditation</b> |       |  |  |  |
|-----------------------------------|-------------|------------|----------------------|-------|--|--|--|
| Chloroxuron <sup>(S)</sup>        | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Chlortoluron <sup>(S)</sup>       | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Diiflubenzuron <sup>(S)</sup>     | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Dimefuron <sup>(S)</sup>          | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Diuron <sup>(S)</sup>             | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Isoproturon <sup>(S)</sup>        | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Linuron <sup>(S)</sup>            | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Methabenzthiazuron <sup>(S)</sup> | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Metoxuron <sup>(S)</sup>          | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Monolinuron <sup>(S)</sup>        | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Monuron <sup>(S)</sup>            | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |
| Pencycuron <sup>(S)</sup>         | mg/kg       | < 0.1      | NONE                 | < 0.1 |  |  |  |

Analytical results are expressed on a dry weight basis where samples are dried at less than 30 °C  
 Subcontracted analysis <sup>(S)</sup>



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| Soil Analysis Certificate - Sample Descriptions |  |
|-------------------------------------------------|--|
| QTS Environmental Report No: 12-11610           |  |
| Soils Ltd                                       |  |
| Site Reference: Ranelagh Road, Havant           |  |
| Project / Job Ref: 13284                        |  |
| Order No: None Supplied                         |  |
| Reporting Date: 08/11/2012                      |  |

| QTSE Sample No | TP / BH No | Additional Refs | Depth (m) | Moisture Content (%) | Sample Matrix Description                    |
|----------------|------------|-----------------|-----------|----------------------|----------------------------------------------|
| 54862          | WS1        | None Supplied   | 0.10      | 17.1                 | Brown clayey loam with stones and chalk      |
| 54863          | WS2        | None Supplied   | 0.30      | 26.4                 | Brown loamy clay with vegetation and stones  |
| 54864          | WS3        | None Supplied   | 0.10      | 21.7                 | Light brown clayey sand with chalk           |
| 54865          | WS4        | None Supplied   | 0.10      | 23.4                 | Brown clayey loam with vegetation and rubble |
| 54866          | WS4        | None Supplied   | 0.40      | 18.7                 | Light brown clay with vegetation             |
| 54867          | S1         | None Supplied   | 0.40      | 27.5                 | Brown loamy clay with vegetation             |
| 54868          | TP1        | None Supplied   | 0.20      | 27.4                 | Brown loamy clay with vegetation             |
| 54869          | TP2        | None Supplied   | 0.50      | 23.4                 | Brown loamy clay with vegetation             |
| 54870          | TP3        | None Supplied   | 0.40      | 21.8                 | Brown clayey loam with vegetation            |

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



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#### Soil Analysis Certificate - Methodology & Miscellaneous Information

**QTS Environmental Report No: 12-11610**

**Soils Ltd**

**Site Reference: Ranelagh Road, Havant**

**Project / Job Ref: 13284**

**Order No: None Supplied**

**Reporting Date: 08/11/2012**

| Matrix | Analysed On | Determinand                                          | Brief Method Description                                                                                                                                      | Method No |
|--------|-------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Soil   | D           | Metals                                               | Determination of metals by aqua-regia digestion followed by ICP-OES                                                                                           | E002      |
| Soil   | D           | Cations                                              | Determination of cations in soil by aqua-regia digestion followed by ICP-OES                                                                                  | E002      |
| Soil   | D           | Boron - Water Soluble                                | Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES                                                                     | E012      |
| Soil   | AR          | Chromium - Hexavalent                                | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry          | E016      |
| Soil   | D           | Magnesium - Water Soluble                            | Determination of water soluble magnesium by extraction with water followed by ICP-OES                                                                         | E025      |
| Soil   | AR          | Asbestos Screening                                   | Visual screening of samples for fibrous material                                                                                                              | E024      |
| Soil   | D           | Chloride - Water Soluble (2:1)                       | Determination of chloride by extraction with water & analysed by ion chromatography                                                                           | E021      |
| Soil   | AR          | Cyanide - Total                                      | Determination of total cyanide by distillation followed by colorimetry                                                                                        | E015      |
| Soil   | AR          | Cyanide - Complex                                    | Determination of complex cyanide by distillation followed by colorimetry                                                                                      | E015      |
| Soil   | AR          | Cyanide - Free                                       | Determination of free cyanide by distillation followed by colorimetry                                                                                         | E015      |
| Soil   | AR          | Electrical Conductivity                              | Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement                                      | E022      |
| Soil   | D           | Elemental Sulphur                                    | Determination of elemental sulphur by solvent extraction followed by turbidimeter                                                                             | E020      |
| Soil   | D           | Fluoride - Water Soluble                             | Determination of Fluoride by extraction with water & analysed by ion chromatography                                                                           | E023      |
| Soil   | D           | FOC (Fraction Organic Carbon)                        | Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate                              | E011      |
| Soil   | D           | Loss on Ignition @ 450°C                             | Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace                                                | E019      |
| Soil   | AR          | Moisture Content                                     | Moisture content; determined gravimetrically                                                                                                                  | E003      |
| Soil   | D           | Organic Matter                                       | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate                                          | E011      |
| Soil   | AR          | pH                                                   | Determination of pH by addition of water followed by electrometric measurement                                                                                | E007      |
| Soil   | D           | Phosphorus                                           | Determination of phosphorus by aqua-regia digestion followed by ICP-OES                                                                                       | E002      |
| Soil   | D           | Sulphate (as SO <sub>4</sub> ) - Water Soluble (2:1) | Determination of water soluble sulphate by extraction with water followed by ICP-OES                                                                          | E014      |
| Soil   | D           | Sulphate (as SO <sub>4</sub> ) - Total               | Determination of total sulphate by extraction with 10% HCl followed by ICP-OES                                                                                | E013      |
| Soil   | AR          | Sulphide                                             | Determination of sulphide by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode | E018      |
| Soil   | D           | Sulphur - Total                                      | Determination of total sulphur by extraction with aqua-regia, potassium iodide/iodate followed by ICP-OES                                                     | E002      |
| Soil   | AR          | Thiocyanate (as SCN)                                 | Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry           | E017      |
| Soil   | D           | Total Organic Carbon (TOC)                           | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate                                          | E011      |
| Soil   | AR          | BTEX                                                 | Determination of BTEX by headspace GC-MS                                                                                                                      | E001      |
| Soil   | D           | Cyclohexane Extractable Matter (CEM)                 | Gravimetrically determined through extraction with cyclohexane                                                                                                | E009      |
| Soil   | AR          | Diesel Range Organics (C10 - C24)                    | Determination of hexane/acetone extractable hydrocarbons by GC-FID                                                                                            | E004      |
| Soil   | AR          | Mineral Oil (C10 - C40)                              | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge                                                           | E004      |
| Soil   | AR          | PAH - Speciated (EPA 16)                             | Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards                         | E005      |
| Soil   | AR          | PCB - 7 Congeners                                    | Determination of PCB by extraction with acetone and hexane followed by GC-MS                                                                                  | E008      |
| Soil   | D           | Petroleum Ether Extract (PEE)                        | Gravimetrically determined through extraction with petroleum ether                                                                                            | E009      |
| Soil   | AR          | Phenols - Total (monohydric)                         | Determination of phenols by distillation followed by colorimetry                                                                                              | E010      |
| Soil   | AR          | SVOC                                                 | Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS                                                        | E006      |
| Soil   | D           | Toluene Extractable Matter (TEM)                     | Gravimetrically determined through extraction with toluene                                                                                                    | E009      |
| Soil   | AR          | EPH (C10 - C40)                                      | Determination of acetone/hexane extractable hydrocarbons by GC-FID                                                                                            | E004      |
| Soil   | AR          | VPH (C6 - C10)                                       | Determination of hydrocarbons C6-C10 by headspace GC-MS                                                                                                       | E001      |
| Soil   | AR          | EPH TEXAS                                            | Determination of acetone/hexane extractable hydrocarbons by GC-FID                                                                                            | E004      |
| Soil   | AR          | TPH CWG                                              | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge                                                           | E004      |
| Soil   | AR          | TPH LQM                                              | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge                                                           | E004      |
| Soil   | AR          | EPH (with florisis cleanup)                          | Determination of acetone/hexane extractable hydrocarbons with florisis cleanup step by GC-FID                                                                 | E004      |
| Soil   | AR          | EPH Product ID                                       | Determination of acetone/hexane extractable hydrocarbons by GC-FID                                                                                            | E004      |
| Soil   | AR          | VOCs                                                 | Determination of volatile organic compounds by headspace GC-MS                                                                                                | E001      |

Key

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

## APPENDIX D- Statistical Analysis

### Statistical Analysis with the Hotspot

# Test Results

Client/client ref: Site ref: 14099 Date: 23-Jul-2008  
Project ref: Data description: Cover User details: Rob Higginson

**Dataset:** Reduced dig (mg/kg)

|                                    |        |
|------------------------------------|--------|
| Sample mean, $\bar{x}$ (mg/kg)     | 99.419 |
| Sample standard deviation, s       | 95.565 |
| Sample size, n                     | 31     |
| Critical concentration, Cc (mg/kg) | 200    |

Use Normal distribution to test

**Outliers & non-detects**

|                    |     |
|--------------------|-----|
| Outliers present?  | YES |
| Significance level | 5%  |
| Outliers removed?  | 0   |
| Non-detects        | 0   |

**Normality test**

Significance level: 5%

Non-normal distribution

Use: Auto: Chebychev

**Test scenario:** Planning: is true mean lower than critical concentration ( $\mu < C_c$ )?

Null hypothesis: The true mean concentration is equal to or greater than the critical concentration:  $\mu \geq C_c$

Alternative hypothesis: The true mean concentration is less than the critical concentration:  $\mu < C_c$

**Evidence against Null hypothesis:** 97%

Base decision on: evidence level

Evidence level required: 95%

Balance of probability? N/A

Reject Null Hypothesis? Yes

**$\mu < C_c$  (re this dataset)**

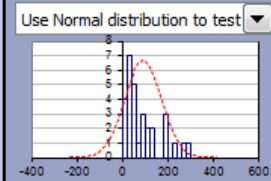
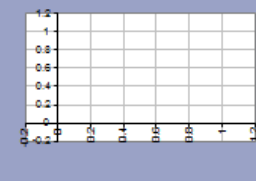
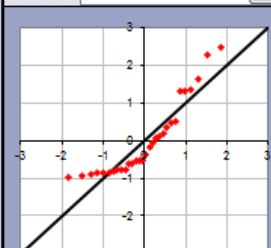
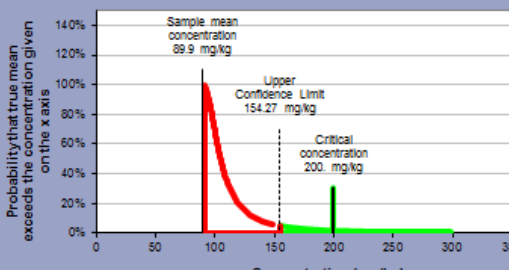
Back to data

Back to summary

Go to outlier test

Go to normality test

|                                                                                                                                                                                          |                                                                                    |                                                                      |                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------|----------------------|
| Client/client ref:<br>Project ref:<br>Site ref: 14099<br>Data description: Cover<br>Contaminant(s): Lead<br>Test scenario: Planning<br>Date: 23 July 2008<br>User details: Rob Higginson | Reduced dig (mg/kg)                                                                | (mg/kg)                                                              | (mg/kg)              |
| Critical concentration, C <sub>c</sub>                                                                                                                                                   | 200                                                                                | 44                                                                   | 200                  |
| Notes                                                                                                                                                                                    | Planning example from "Guidance Note on Comparing Soil"                            | Part 2A example from "Guidance Note on Comparing Soil Contamination" |                      |
| Sample size, n                                                                                                                                                                           | 31                                                                                 | 0                                                                    | 0                    |
| Sample mean, $\bar{x}$                                                                                                                                                                   | 99.419355                                                                          | No Data                                                              | No Data              |
| Standard deviation, s                                                                                                                                                                    | 95.564559                                                                          |                                                                      |                      |
| Number of non-detects                                                                                                                                                                    | 0                                                                                  |                                                                      |                      |
| Set non-detect values to:                                                                                                                                                                | Half detection limit                                                               | Half detection limit                                                 | Half detection limit |
| Outliers?                                                                                                                                                                                | Yes                                                                                |                                                                      |                      |
| Distribution                                                                                                                                                                             | Non-normal                                                                         |                                                                      |                      |
| Statistical approach                                                                                                                                                                     | Auto: Chebychev                                                                    | Auto                                                                 | Auto                 |
| Test scenario:                                                                                                                                                                           | Planning: is true mean lower than critical concentration?                          |                                                                      |                      |
| t statistic, t <sub>0</sub> (or k <sub>0</sub> )                                                                                                                                         | -5.86001063                                                                        |                                                                      |                      |
| Upper confidence limit (on true mean concentration, $\mu$ )                                                                                                                              | 174.23507                                                                          |                                                                      |                      |
| Evidence level                                                                                                                                                                           | 97%                                                                                |                                                                      |                      |
| Base decision on:                                                                                                                                                                        | evidence level                                                                     |                                                                      |                      |
| Result                                                                                                                                                                                   | $\mu < C_c$                                                                        |                                                                      |                      |
| Select dataset                                                                                                                                                                           | <input checked="" type="radio"/> Y <input type="radio"/> Y <input type="radio"/> Y |                                                                      |                      |
| Back to data                                                                                                                                                                             | Go to outlier test                                                                 |                                                                      |                      |

| Test Results                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Client/client ref:<br>Project ref:                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Site ref: 14099<br>Data description: | Date: 00-Jan-1900<br>User details: Dr Eliane Foteu |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------------------|
| <b>Dataset:</b> Reduced dig (mg/kg)                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <div style="display: flex; justify-content: space-between;"> <div> <b>Use Normal distribution to test</b><br/>  </div> <div> <b>Outliers &amp; non-detects</b><br/>           Outliers present? NO<br/>           Significance level 5%<br/>           Outliers removed? 0<br/>           Non-detects 0         </div> <div>  </div> </div> |                                      |                                                    |
| <b>Normality test</b><br>Significance level: 5%<br>Non-normal distribution<br>Use: Auto: Chebychev | <b>Test scenario:</b> Planning: is true mean lower than critical concentration ( $\mu < C_c$ )?<br><b>Null hypothesis:</b> The true mean concentration is equal to or greater than the critical concentration: $\mu \geq C_c$<br><b>Alternative hypothesis:</b> The true mean concentration is less than the critical concentration: $\mu < C_c$                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                      |                                                    |
|                   | <div style="display: flex;"> <div style="flex: 1;">  </div> <div style="flex: 1; padding-left: 10px;"> <b>Evidence against Null hypothesis:</b> 98%<br/>           Base decision on: evidence level<br/>           Evidence level required: 95%<br/>           Balance of probability? N/A<br/>           Reject Null Hypothesis? Yes<br/> <div style="background-color: #007bff; color: white; padding: 5px; text-align: center;"> <math>\mu &lt; C_c</math> (re this dataset)         </div> </div> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                      |                                                    |

Back to data

Back to summary

Go to outlier test

Go to normality test

|                                                                                                                                                                                   |                                                           |                                                                      |                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------|-------------------------|
| Client/client ref:<br>Project ref:<br>Site ref: 14099<br>Data description:<br>Contaminant(s):<br>Test scenario: Planning<br>Date: 0 January 1900<br>User details: Dr Eliane Foteu | Reduced dig (mg/kg)                                       | (mg/kg)                                                              | (mg/kg)                 |
| Critical concentration, $C_c$                                                                                                                                                     | 200                                                       | 44                                                                   | 24                      |
| Notes                                                                                                                                                                             | Planning example from "Guidance Note on Comparing Soil"   | Part 2A example from "Guidance Note on Comparing Soil Contamination" |                         |
| Sample size, n                                                                                                                                                                    | 30                                                        | 0                                                                    | 0                       |
| Sample mean, $\bar{x}$                                                                                                                                                            | 89.9                                                      | No Data                                                              | No Data                 |
| Standard deviation, s                                                                                                                                                             | 80.87937                                                  |                                                                      |                         |
| Number of non-detects                                                                                                                                                             | 0                                                         |                                                                      |                         |
| Set non-detect values to:                                                                                                                                                         | Half detection limit                                      | Half detection limit                                                 | Half detection limit    |
| Outliers?                                                                                                                                                                         | No                                                        |                                                                      |                         |
| Distribution                                                                                                                                                                      | Non-normal                                                |                                                                      |                         |
| Statistical approach                                                                                                                                                              | Auto: Chebychev                                           | Auto                                                                 | Auto                    |
| Test scenario:                                                                                                                                                                    | Planning: is true mean lower than critical concentration? |                                                                      |                         |
| t statistic, $t_0$ (or $k_0$ )                                                                                                                                                    | -7.45607365                                               |                                                                      |                         |
| Upper confidence limit (on true mean concentration, $\mu$ )                                                                                                                       | 154.26562                                                 |                                                                      |                         |
| Evidence level                                                                                                                                                                    | 98%                                                       |                                                                      |                         |
| Base decision on:                                                                                                                                                                 | evidence level                                            |                                                                      |                         |
| Result                                                                                                                                                                            | $\mu < C_c$                                               |                                                                      |                         |
| Select dataset                                                                                                                                                                    | <input checked="" type="radio"/> Y                        | <input type="radio"/> Y                                              | <input type="radio"/> Y |
| Back to data                                                                                                                                                                      | Go to outlier test                                        |                                                                      |                         |