

## Foreman Homes

Via Email Only To: Sam Collins, Sam.Collins@foremanhomesltd.co.uk  
Michael Avery, michael@foremanhomes.co.uk  
Copy to: Steve Carrington, steve@foremanhomes.co.uk  
Laurent Lemagen, Laurent.Lemagen@havant.gov.uk

7<sup>th</sup> August 2015

Your ref: Supplementary Formation level testing around identified lead hotspot

Our ref: Letter Report: I4933/VR

Dear Sirs,

FAO: Michael Avery

## Re: 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 and includes the results of recent formation level testing carried out around the area of the known Lead hotspot. It must be read in conjunction with the Reports and plans presented in Table I. We have relied on these reports and plans, 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. Documents relied upon**

| Reference          | Report                               | Author             | Date          |
|--------------------|--------------------------------------|--------------------|---------------|
| 002                | Existing site plan                   | Reuby & Stagg Ltd  | June 2012     |
| 01                 | Proposed Development Plan            | ADP Architects Ltd | May 2014      |
| I4099/GIR          | Phase II Ground Investigation Report | Soils Limited      | February 2014 |
| I4099/PL           | Letter Report                        | Soils Limited      | February 2014 |
| I4099/GIR          | Phase II Ground Investigation Report | Soils Limited      | March 2014    |
| I4099/GIR/Rev 2.00 | Phase II Ground Investigation Report | Soils Limited      | December 2014 |
| I4933/ESFM         | Human Health Risk Assessment         | Soils Limited      | May 2015      |

Following further discussions Havant Borough Council requested further data to enhance the existing dataset relating to the Lead hotspot previously identified within the vicinity of VS8 (Plot 75). Particular attention was paid to testing material at planned formation level. The anticipated formation level was specified by the client as approximately 500mm bgl as this was the depth of the anticipated site strip in the area of the site around VS8.

Depending on the concentrations of the Lead present within the stripped material and the results of soil testing on the stripped material, the local authority was happy with the principle of reusing the stripped material on-site to build up levels as required under buildings and other hard

landscaped areas. The locations of any reused material must be appropriately documented and this information provided to the local authority.

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

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 hard landscaping such as access roads and soft landscaping such as private gardens.

### **Site Works**

On the 15<sup>th</sup> July 2015 a total of four trial holes were machine excavated, using plant supplied by the client, to depths of between 1.00 and 1.10m bgl, this allowed samples to be taken from the anticipated surface level and approximately 500mm below proposed formation level. One trial hole was located within each of the four plots with rear gardens in the vicinity of the Lead hotspot (i.e. plots 75 and the adjacent plots; 74, 76 and 77). The full trial hole logs have been appended to this letter report (Appendix A). Trial Hole locations are presented on Figure 1.

### **Chemical Testing – Human Health**

A total of four soil samples were taken from the proposed formation level (i.e. >500mm bgl in order to check that soils readily accessible to the end receptor were free of contaminants and a further four samples were taken from approximately 600mm to 1000mm below the proposed formation level.

These samples were then sent for chemical laboratory testing in order to assess the chemical composition of the soil, particular attention was paid to any Lead present. Table 2 presents the details of the samples tested.

**Table 2 Summary of Samples tested – Human Health**

| Sample ID<br>Location : Depth (m bgl) | Reason tested                           | Tests Scheduled                       |
|---------------------------------------|-----------------------------------------|---------------------------------------|
| Plot 74 :0.60                         | Proposed Formation Level                | CLEA Metals Suite<br>(Including Lead) |
| Plot 75 : 0.60                        |                                         |                                       |
| Plot 76 : 0.60                        |                                         |                                       |
| Plot 77 : 0.65                        |                                         |                                       |
| Plot 74 : 1.00                        | 500mm below proposed formation<br>level |                                       |
| Plot 75 : 1.10                        |                                         |                                       |
| Plot 76 : 1.00                        |                                         |                                       |
| Plot 77 : 1.00                        |                                         |                                       |

Concentrations of contaminants tested were 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 full results of the chemical tests are appended to this report (Appendix C).

In summary, the results show that the soils at formation level and the underlying natural soils at 500mm beneath proposed formation contained no heavy metals or Lead in excess of the relevant guidelines.

### **Chemical Testing – Stripped Material**

A total of three samples were taken from the material between ground level (at the time of the investigation) and 500mm bgl. These samples were sent to the laboratory for heavy metal leachate testing. This material was to be removed from the area around the VVS8 hotspot as part of the proposed level changes (site strip) and, where possible, was to be re-used elsewhere on site in order to reduce the quantity of material that was required off-site disposal. Table 3 presents the details of the samples tested.

**Table 3. Summary of Samples tested – Stripped Material**

| <b>Sample ID<br/>Location : Depth(m bgl)</b> | <b>Reason tested</b>                        | <b>Tests Scheduled</b>                           |
|----------------------------------------------|---------------------------------------------|--------------------------------------------------|
| Plot 74 : 0.40                               | Material to be stripped and reused on site. | CLEA Metals Suite – Leachate<br>(Including Lead) |
| Plot 75 : 0.30-0.50                          |                                             |                                                  |
| Plot 76 : 0.10-0.30                          |                                             |                                                  |

Testing of the material to be stripped identified no heavy metals or Lead above the relevant guidelines, in addition the Leachate tests also revealed no heavy metals or lead above the relevant guidelines, therefore the material could be reused on site.

### **Chemical Testing – Topsoil**

At the time of sampling a stockpile of topsoil that had been stripped from other parts of the site was present in the area of the proposed sampling. This material was intended for re-use across the site within areas of proposed soft landscaping and historical testing presented in earlier reports has shown that the material was suitable for this purpose. A supplementary sample was taken from the eastern end of the retained Topsoil stockpile on-site. The sample was sent to the laboratory for chemical testing (both solid and leachate testing) to confirm its suitability for re-use. Table 4 presents the details of the samples tested.

**Table 4. Summary of Samples tested – Topsoil**

| <b>Sample ID<br/>Location : Depth(m bgl)</b> | <b>Reason tested</b>        | <b>Tests Scheduled</b>                                                                                                                       |
|----------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Topsoil Stockpile                            | Topsoil Proposed for Re-use | Soils Suite I<br>(As, Be, Br, B, Cd, Cr, Cu, Pb, Mg, Ni, Se, V, Zn, Cyanide<br>Asbestos screening, Sulphate, Sulphide, TOC, PAH,<br>Phenols) |
| Topsoil Stockpile                            |                             | CLEA Metals Suite – Leachate<br>(Including Lead)                                                                                             |

Testing of the stockpiled topsoil identified no contaminants in excess of the relevant guidelines (both solid and leachate).

### **Waste Acceptance Criteria Testing**

One sample originating from the material to be stripped (i.e. above formation level) was sent to the laboratory for Waste Acceptance Criteria Testing in order to establish the likely waste category for the material – should off-site disposal need to be considered. Table 5 presents the details of the sample tested.

**Table 5. Summary of Samples tested - WAC**

| <b>Sample ID<br/>Location : Depth(m bgl)</b> | <b>Reason tested</b>                                      | <b>Tests Scheduled</b>          |
|----------------------------------------------|-----------------------------------------------------------|---------------------------------|
| Plot 77 : 0.10-0.40                          | Material to be stripped and potentially removed from site | Waste Acceptance Criteria (WAC) |

The results of WAC test classified the material as inert waste for the purposes of waste disposal.

## Conclusions

The results of the chemical testing has shown that the soil around the previously identified Lead hotspot are free from contamination and suitable for re-use on site. The formation level also tested was proved to be free of heavy metal (in particular, Lead) contamination, therefore no further remediation will required following the proposed 500mm site strip in the area of Plots 74 to 77 as the proposed strip in this area will remove the previously identified hotspot of WS8.

Should the client wish the stripped material to be disposed of via a waste haulier, it may be considered as inert waste.

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

The following figures and Appendices complete this letter report;

*Figure 1. Site Location Plan*

*Figure 2. Trial Hole Location Plan*

*Appendix A. Field Logs*

*Appendix B. Human Health Assessment Criteria*

*Appendix C. Chemical Laboratory Results*

Best regards,



T. Rees-Blanchard *B.Eng. (Hons), FGS*  
**Graduate Geoenvironmental Engineer**

For and on Behalf of Soils Limited

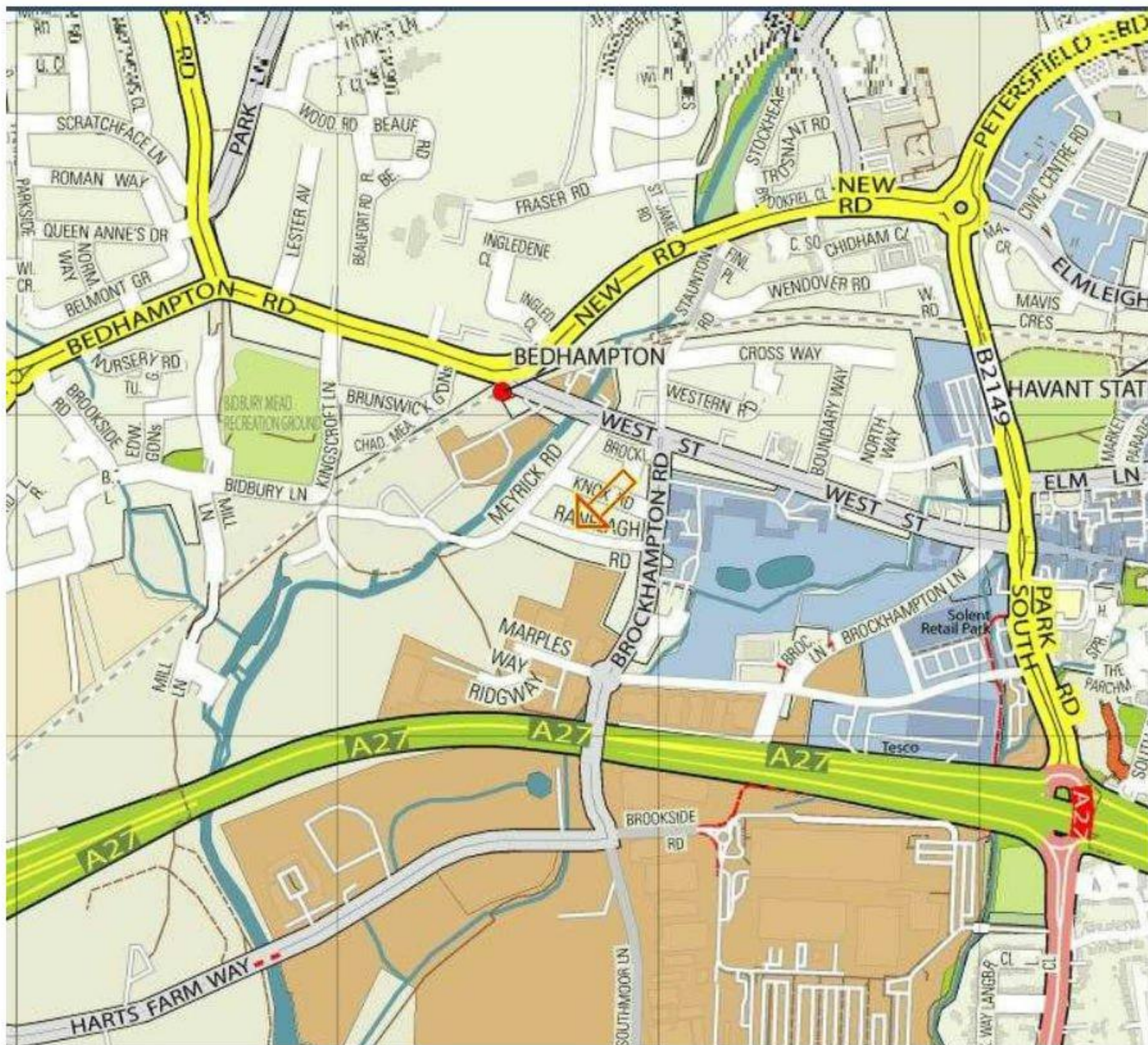


**Figure number**

1

**Title**

Site Location Map

**Project**

Land South of Ranelagh Road

**Date**

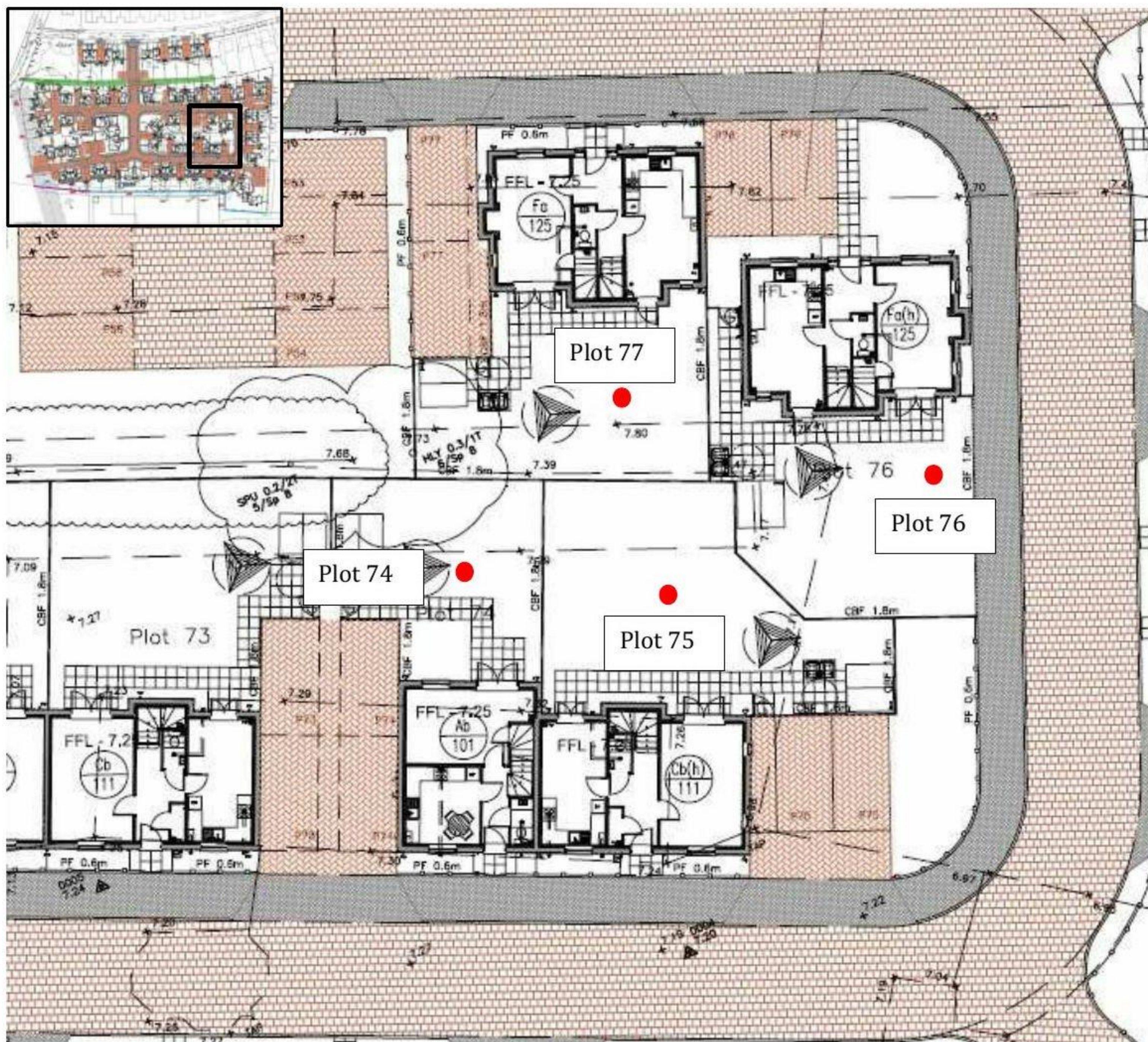
July 2015

**Client**

Foreman Homes

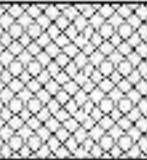
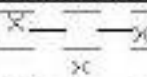
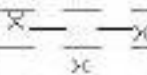
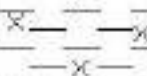
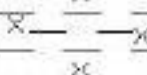
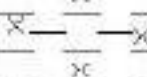
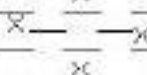
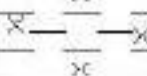
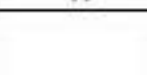
**Reference**

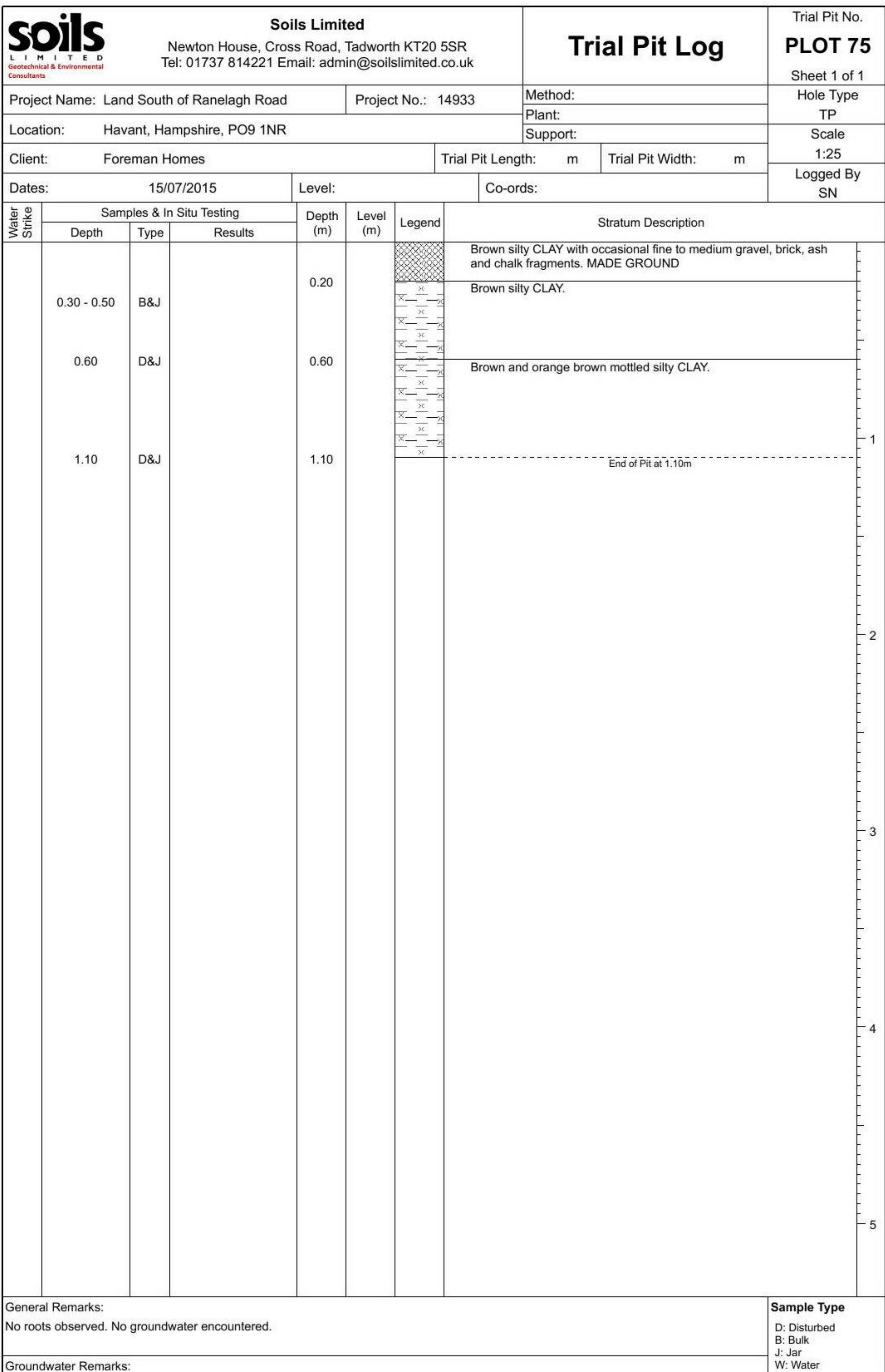
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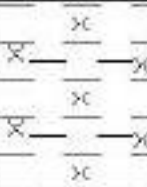
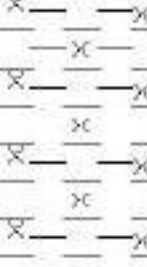
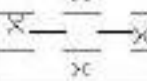


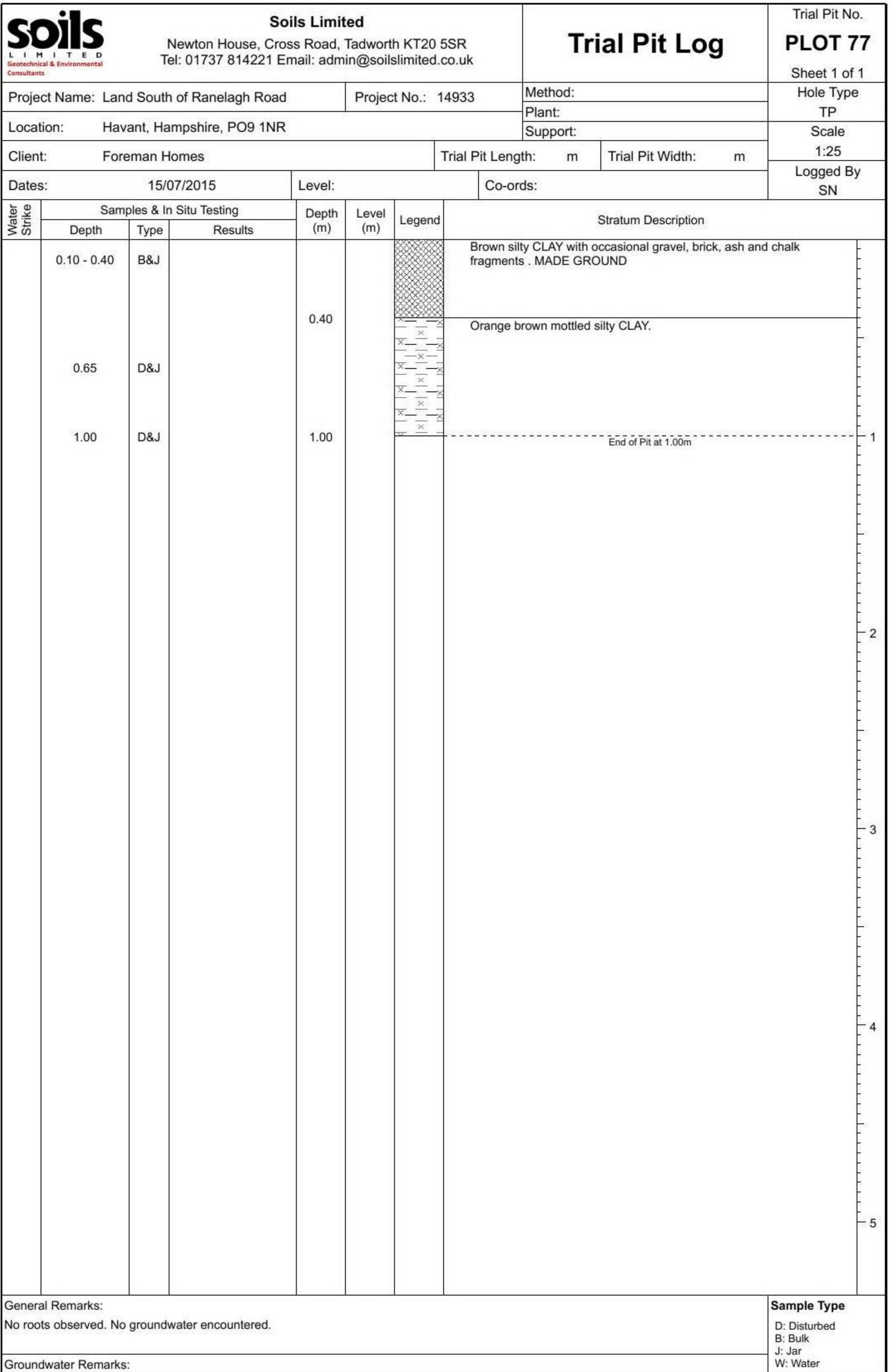
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## APPENDIX A-Field Logs

|  |                           | <b>Soils Limited</b><br>Newton House, Cross Road, Tadworth KT20 5SR<br>Tel: 01737 814221 Email: admin@soilslimited.co.uk |         |                     | <b>Trial Pit Log</b> |                                                                                       | Trial Pit No.<br><b>PLOT 74</b><br>Sheet 1 of 1                                                     |                                                              |
|----------------------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------|---------|---------------------|----------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Project Name: Land South of Ranelagh Road                                        |                           |                                                                                                                          |         | Project No.: 14933  |                      | Method:                                                                               |                                                                                                     | Hole Type<br>TP                                              |
| Location: Havant, Hampshire, PO9 1NR                                             |                           |                                                                                                                          |         |                     |                      | Plant:                                                                                |                                                                                                     |                                                              |
| Client: Foreman Homes                                                            |                           |                                                                                                                          |         | Trial Pit Length: m |                      | Trial Pit Width: m                                                                    |                                                                                                     | Scale<br>1:25                                                |
| Dates: 15/07/2015                                                                |                           |                                                                                                                          |         | Level:              |                      | Co-ords:                                                                              |                                                                                                     | Logged By<br>SN                                              |
| Water<br>Strike                                                                  | Samples & In Situ Testing |                                                                                                                          |         | Depth<br>(m)        | Level<br>(m)         | Legend                                                                                | Stratum Description                                                                                 |                                                              |
|                                                                                  | Depth                     | Type                                                                                                                     | Results |                     |                      |                                                                                       |                                                                                                     |                                                              |
|                                                                                  |                           |                                                                                                                          |         | 0.25                |                      |    | Brown silty CLAY with occasional fine to medium gravel, ash, brick and chalk fragments. MADE GROUND |                                                              |
|                                                                                  | 0.40                      | B&J                                                                                                                      |         |                     |                      |    | Brown silty CLAY with occasional fine to medium roots.                                              |                                                              |
|                                                                                  | 0.60                      | D&J                                                                                                                      |         |                     |                      |    |                                                                                                     |                                                              |
|                                                                                  | 1.00                      | D&J                                                                                                                      |         | 1.10                |                      |    |                                                                                                     |                                                              |
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| General Remarks:                                                                 |                           |                                                                                                                          |         |                     |                      |                                                                                       |                                                                                                     | Sample Type<br>D: Disturbed<br>B: Bulk<br>J: Jar<br>W: Water |
| Roots observed to 1.10m bgl. No groundwater encountered                          |                           |                                                                                                                          |         |                     |                      |                                                                                       |                                                                                                     |                                                              |
| Groundwater Remarks:                                                             |                           |                                                                                                                          |         |                     |                      |                                                                                       |                                                                                                     |                                                              |



|  |                           | <b>Soils Limited</b><br>Newton House, Cross Road, Tadworth KT20 5SR<br>Tel: 01737 814221 Email: admin@soilslimited.co.uk |         | <b>Trial Pit Log</b> |              | Trial Pit No.<br><b>PLOT 76</b><br>Sheet 1 of 1                                     |                                                                     |
|----------------------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------|---------|----------------------|--------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Project Name: Land South of Ranelagh Road                                        |                           | Project No.: 14933                                                                                                       |         | Method:              |              | Hole Type<br>TP                                                                     |                                                                     |
| Location: Havant, Hampshire, PO9 1NR                                             |                           |                                                                                                                          |         | Plant:               |              |                                                                                     |                                                                     |
| Client: Foreman Homes                                                            |                           | Trial Pit Length: m                                                                                                      |         | Trial Pit Width: m   |              | Scale<br>1:25                                                                       |                                                                     |
| Dates: 15/07/2015                                                                |                           | Level:                                                                                                                   |         | Co-ords:             |              | Logged By<br>SN                                                                     |                                                                     |
| Water<br>Strike                                                                  | Samples & In Situ Testing |                                                                                                                          |         | Depth<br>(m)         | Level<br>(m) | Legend                                                                              | Stratum Description                                                 |
|                                                                                  | Depth                     | Type                                                                                                                     | Results |                      |              |                                                                                     |                                                                     |
|                                                                                  | 0.10 - 0.30               | D&J                                                                                                                      |         | 0.20                 |              |  | Brown silty CLAY with occasional gravel, brick and ash. MADE GROUND |
|                                                                                  |                           |                                                                                                                          |         |                      |              |  | Brown silty CLAY.                                                   |
|                                                                                  | 0.60                      | D&J                                                                                                                      |         | 0.50                 |              |  | Orange brown mottled silty CLAY.                                    |
|                                                                                  | 1.00                      | D&J                                                                                                                      |         | 1.10                 |              |  | End of Pit at 1.10m                                                 |
|                                                                                  |                           |                                                                                                                          |         |                      |              |                                                                                     |                                                                     |
| General Remarks:<br>No roots observed. No groundwater encountered.               |                           |                                                                                                                          |         |                      |              |                                                                                     | <b>Sample Type</b><br>D: Disturbed<br>B: Bulk<br>J: Jar<br>W: Water |
| Groundwater Remarks:                                                             |                           |                                                                                                                          |         |                      |              |                                                                                     |                                                                     |



## **APPENDIX B- Human Health Generic 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.

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- 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.
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#### **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 Plant Uptake |       |       |                            |       |       |            |        |        | Public Open Space (POS) |         |         |             |        |        |        |        |        | Name   | Authority | Date     |      |
|----------------------------------|----------------------|-----------|------------------------------------------|-------|-------|----------------------------|-------|-------|------------|--------|--------|-------------------------|---------|---------|-------------|--------|--------|--------|--------|--------|--------|-----------|----------|------|
|                                  |                      |           | With home-grown produce                  |       |       | Without home-grown produce |       |       | Allotments |        |        | Commercial              |         |         | Residential |        |        | Park   |        |        |        |           |          |      |
| Type                             | Contaminants         | Species   | Year                                     | 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      |           |          |      |
| 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     |      |
|                                  | BTEX & MTBE          | Zinc      |                                          | 2015  |       | 3700                       |       |       | 40000      |        |        | 620                     |         |         | 730000      |        |        | 81000  |        |        | 170000 | S4UL      | LQM/CIEH | 2015 |
| Benzene                          |                      |           | 2012                                     |       | 0.33  |                            |       | 0.33  |            |        | 0.07   |                         |         | 95      |             |        |        |        |        |        | SGV    | DEFRA     | 2012     |      |
|                                  |                      |           | 2014                                     |       | 0.87  |                            |       | 3.3   |            |        | 0.18   |                         |         | 98      |             |        | 140    |        |        | 230    | C4SL   | DEFRA     | 2014     |      |
|                                  |                      |           | 2015                                     | 0.087 | 0.17  | 0.37                       | 0.38  | 0.7   | 1.4        | 0.017  | 0.034  | 0.075                   | 27      | 47      | 90          | 72     | 72     | 73     | 90     | 100    | 110    | S4UL      | LQM/CIEH | 2015 |
| Toluene                          |                      |           | 2012                                     |       |       | 610                        |       |       | 610        |        |        | 120                     |         |         | 4400        |        |        |        |        |        | SGV    | DEFRA     | 2012     |      |
|                                  |                      |           | 2015                                     | 130   | 290   | 660                        | 880   | 1900  | 3900       | 22     | 51     | 120                     | 65000   | 110000  | 180000      | 56000  | 56000  | 56000  | 87000  | 95000  | 100000 | S4UL      | LQM/CIEH | 2015 |
| Ethylbenzene                     |                      |           | 2012                                     |       |       | 350                        |       |       | 350        |        |        | 90                      |         |         | 2800        |        |        |        |        |        | SGV    | DEFRA     | 2012     |      |
|                                  |                      |           | 2015                                     | 47    | 110   | 260                        | 83    | 190   | 440        | 16     | 39     | 91                      | 4700    | 13000   | 27000       | 24000  | 24000  | 25000  | 17000  | 22000  | 27000  | S4UL      | LQM/CIEH | 2015 |
| Xylenes                          |                      | o-xylene  | 2012                                     |       |       | 250                        |       |       | 250        |        |        | 160                     |         |         | 2600        |        |        |        |        |        | SGV    | DEFRA     | 2012     |      |
|                                  |                      |           | 2015                                     | 60    | 140   | 330                        | 88    | 210   | 480        | 28     | 67     | 160                     | 6600    | 15000   | 33000       | 41000  | 42000  | 43000  | 17000  | 24000  | 33000  | S4UL      | LQM/CIEH | 2015 |
|                                  |                      | m-xylene  | 2012                                     |       |       | 240                        |       |       | 240        |        |        | 180                     |         |         | 3500        |        |        |        |        |        | SGV    | DEFRA     | 2012     |      |
|                                  |                      |           | 2015                                     | 59    | 140   | 320                        | 82    | 190   | 450        | 31     | 74     | 170                     | 6200    | 14000   | 31000       | 41000  | 42000  | 43000  | 17000  | 24000  | 32000  | S4UL      | LQM/CIEH | 2015 |
|                                  |                      | p-xylene  | 2012                                     |       |       | 230                        |       |       | 230        |        |        | 160                     |         |         | 3200        |        |        |        |        |        | SGV    | DEFRA     | 2012     |      |
|                                  |                      | 2015      | 56                                       | 130   | 310   | 79                         | 180   | 310   | 29         | 69     | 160    | 5900                    | 14000   | 30000   | 41000       | 42000  | 43000  | 17000  | 23000  | 31000  | S4UL   | LQM/CIEH  | 2015     |      |
| Petroleum Hydrocarbons Fractions | Aliphatic >C5 - C6   |           | 2015                                     | 42    | 78    | 160                        | 42    | 78    | 160        | 730    | 1700   | 3900                    | 3200    | 5900    | 12000       | 570000 | 590000 | 600000 | 95000  | 130000 | 180000 | S4UL      | LQM/CIEH | 2015 |
|                                  | Aliphatic >C6 - C8   |           | 2015                                     | 100   | 230   | 530                        | 100   | 230   | 530        | 2300   | 5600   | 13000                   | 7800    | 17000   | 40000       | 600000 | 610000 | 620000 | 150000 | 220000 | 320000 | S4UL      | LQM/CIEH | 2015 |
|                                  | Aliphatic >C8 - C10  |           | 2015                                     | 27    | 65    | 150                        | 27    | 65    | 150        | 320    | 770    | 1700                    | 2000    | 4800    | 11000       | 13000  | 13000  | 13000  | 14000  | 18000  | 21000  | S4UL      | LQM/CIEH | 2015 |
|                                  | Aliphatic >C10 - C12 |           | 2015                                     | 130   | 330   | 760                        | 130   | 330   | 770        | 2200   | 4400   | 7300                    | 9700    | 23000   | 47000       | 13000  | 13000  | 13000  | 21000  | 23000  | 24000  | S4UL      | LQM/CIEH | 2015 |
|                                  | Aliphatic >C12 - C16 |           | 2015                                     | 1100  | 2400  | 4300                       | 1100  | 2400  | 4400       | 11000  | 13000  | 13000                   | 59000   | 82000   | 90000       | 13000  | 13000  | 13000  | 25000  | 25000  | 26000  | S4UL      | LQM/CIEH | 2015 |
|                                  | Aliphatic >C16 - C35 |           | 2015                                     | 65000 | 92000 | 110000                     | 65000 | 92000 | 110000     | 260000 | 270000 | 270000                  | 1600000 | 1700000 | 1800000     | 250000 | 250000 | 250000 | 450000 | 480000 | 490000 | S4UL      | LQM/CIEH | 2015 |
|                                  | Aliphatic >C35 - C44 |           | 2015                                     | 65000 | 92000 | 140000                     | 65000 | 92000 | 110000     | 260000 | 270000 | 270000                  | 1600000 | 1700000 | 1800000     | 250000 | 250000 | 250000 | 450000 | 480000 | 490000 | S4UL      | LQM/CIEH | 2015 |
|                                  | Aromatic >C5 - C7    |           | 2015                                     | 70    | 140   | 300                        | 370   | 690   | 1400       | 13     | 27     | 57                      | 26000   | 46000   | 86000       | 56000  | 56000  | 56000  | 76000  | 84000  | 92000  | S4UL      | LQM/CIEH | 2015 |
|                                  | Aromatic >C7 - C8    |           | 2015                                     | 130   | 290   | 660                        | 860   | 1800  | 3900       | 22     | 51     | 120                     | 56000   | 110000  | 180000      | 56000  | 56000  | 56000  | 87000  | 95000  | 100000 | S4UL      | LQM/CIEH | 2015 |
|                                  | Aromatic >C8 - C10   |           | 2015                                     | 34    | 83    | 190                        | 47    | 110   | 270        | 8.6    | 21     | 51                      | 3500    | 8100    | 17000       | 5000   | 5000   | 5000   | 7200   | 8500   | 9300   | S4UL      | LQM/CIEH | 2015 |
|                                  | Aromatic >C10 - C12  |           | 2015                                     | 74    | 180   | 380                        | 250   | 590   | 1200       | 13     | 31     | 74                      | 16000   | 28000   | 34000       | 5000   | 5000   | 5000   | 9200   | 9700   | 10000  | S4UL      | LQM/CIEH | 2015 |
|                                  | Aromatic >C12 - C16  |           | 2015                                     | 140   | 330   | 660                        | 1800  | 2300  | 2500       | 23     | 57     | 130                     | 36000   | 37000   | 38000       | 5100   | 5100   | 5000   | 10000  | 10000  | 10000  | S4UL      | LQM/CIEH | 2015 |
|                                  | Aromatic >C16 - C21  |           | 2015                                     | 260   | 540   | 930                        | 1900  | 1900  | 1900       | 46     | 110    | 260                     | 28000   | 28000   | 28000       | 3800   | 3800   | 3800   | 7600   | 7700   | 7800   | S4UL      | LQM/CIEH | 2015 |
|                                  | Aromatic >C21 - C35  |           | 2015                                     | 1100  | 1500  | 1700                       | 1900  | 1900  | 1900       | 370    | 820    | 1600                    | 28000   | 28000   | 28000       | 3800   | 3800   | 3800   | 7800   | 7800   | 7900   | S4UL      | LQM/CIEH | 2015 |
|                                  | Aromatic >C34 - C44  |           | 2015                                     | 1100  | 1500  | 1700                       | 1900  | 1900  | 1900       | 370    | 820    | 1600                    | 28000   | 28000   | 28000       | 3800   | 3800   | 3800   | 7800   | 7800   | 7900   | S4UL      | LQM/CIEH | 2015 |

| Land Use                                         | Residential With or Without Plant Uptake                       |                         |         |         |                            |         |        |            |         |        |            |        |        |             |        |        |        |        | Public Open Space (POS) |        |       |          |          |      | Name | Authority | Date |
|--------------------------------------------------|----------------------------------------------------------------|-------------------------|---------|---------|----------------------------|---------|--------|------------|---------|--------|------------|--------|--------|-------------|--------|--------|--------|--------|-------------------------|--------|-------|----------|----------|------|------|-----------|------|
|                                                  | SOM                                                            | With home-grown produce |         |         | Without home-grown produce |         |        | Allotments |         |        | Commercial |        |        | Residential |        |        | Park   |        |                         |        |       |          |          |      |      |           |      |
|                                                  |                                                                | 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     |      |      |           |      |
| Chlorobenzenes                                   | 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     |      |      |           |      |
|                                                  | 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</   |        |             |        |        |        |        |                         |        |       |          |          |      |      |           |      |

| Land Use                |                                            |                                                                                                             | Residential With or Without Plant Uptake |      |      |                    |      |      |            |      |      | Public Open Space (POS) |      |      |             |       |       |       |      |      | Name | Authority | Date     |      |
|-------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------|------|------|--------------------|------|------|------------|------|------|-------------------------|------|------|-------------|-------|-------|-------|------|------|------|-----------|----------|------|
|                         |                                            |                                                                                                             | With                                     |      |      | Without            |      |      | Allotments |      |      | Commercial              |      |      | Residential |       |       | Park  |      |      |      |           |          |      |
|                         |                                            |                                                                                                             | home-grown produce                       | 6    |      | home-grown produce | 6    |      |            |      |      |                         |      |      |             |       |       |       |      |      |      |           |          |      |
| Type                    | Contaminants                               | Species                                                                                                     | Year                                     | 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                                     | 120  | 200  | 380                | 440  | 690  | 1200       | 23   | 42   | 83                      | 440  | 690  | 1300        | 440   | 690   | 1300  | 440  | 690  | 1300 | S4UL      | LQM/CIEH | 2015 |
|                         | Chlorophenols (4 Congeners)                |                                                                                                             | 2015                                     | 0.87 | 2    | 4.5                | 94   | 150  | 210        | 0.13 | 0.3  | 0.7                     | 3500 | 4000 | 4300        | 620   | 620   | 620   | 1100 | 1100 | 1100 | S4UL      | LQM/CIEH | 2015 |
| Others                  | 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 |
|                         | 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- Chemical Laboratory Results**



Craig Morrison  
Soils Ltd  
Thomas Telford House - Unit 11  
Sun Valley Business Park  
Winnall Close  
Winchester  
SO23 0LB



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## **QTS Environmental Report No: 15-33511**

**Site Reference:** Ranelagh Road

**Project / Job Ref:** 14933

**Order No:** None Supplied

**Sample Receipt Date:** 16/07/2015

**Sample Scheduled Date:** 16/07/2015

**Report Issue Number:** 1

**Reporting Date:** 22/07/2015

**Authorised by:**

Russell Jarvis  
Director

**On behalf of QTS Environmental Ltd**

**Authorised by:**

Kevin Old  
Director

**On behalf of QTS Environmental Ltd**

| Soil Analysis Certificate                    |                        |               |  |  |  |  |
|----------------------------------------------|------------------------|---------------|--|--|--|--|
| <b>QTS Environmental Report No: 15-33511</b> | <b>Date Sampled</b>    | 15/07/15      |  |  |  |  |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied |  |  |  |  |
| <b>Site Reference: Ranelagh Road</b>         | <b>TP / BH No</b>      | Plot 77       |  |  |  |  |
| <b>Project / Job Ref: 14933</b>              | <b>Additional Refs</b> | None Supplied |  |  |  |  |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.10 - 0.40   |  |  |  |  |
| <b>Reporting Date: 22/07/2015</b>            | <b>QTSE Sample No</b>  | 157623        |  |  |  |  |

| Determinand                           | Unit     | RL    | Accreditation |              |  |  |  |
|---------------------------------------|----------|-------|---------------|--------------|--|--|--|
| Asbestos Screen                       | N/a      | N/a   | ISO17025      | Not Detected |  |  |  |
| pH                                    | pH Units | N/a   | MCERTS        | 7.9          |  |  |  |
| Total Cyanide                         | mg/kg    | < 2   | NONE          | < 2          |  |  |  |
| W/S Sulphate as SO <sub>4</sub> (2:1) | mg/l     | < 10  | MCERTS        | 41           |  |  |  |
| Sulphide                              | mg/kg    | < 5   | NONE          | < 5          |  |  |  |
| Organic Matter                        | %        | < 0.1 | MCERTS        | 1.8          |  |  |  |
| Total Organic Carbon (TOC)            | %        | < 0.1 | MCERTS        | 1.1          |  |  |  |
| Arsenic (As)                          | mg/kg    | < 2   | MCERTS        | 8            |  |  |  |
| Beryllium (Be)                        | mg/kg    | < 0.5 | NONE          | 0.7          |  |  |  |
| W/S Boron                             | mg/kg    | < 1   | NONE          | < 1          |  |  |  |
| Cadmium (Cd)                          | mg/kg    | < 0.2 | MCERTS        | 0.2          |  |  |  |
| Chromium (Cr)                         | mg/kg    | < 2   | MCERTS        | 25           |  |  |  |
| Chromium (hexavalent)                 | mg/kg    | < 2   | NONE          | < 2          |  |  |  |
| Copper (Cu)                           | mg/kg    | < 4   | MCERTS        | 34           |  |  |  |
| Lead (Pb)                             | mg/kg    | < 3   | MCERTS        | 104          |  |  |  |
| Mercury (Hg)                          | mg/kg    | < 1   | NONE          | < 1          |  |  |  |
| Nickel (Ni)                           | mg/kg    | < 3   | MCERTS        | 21           |  |  |  |
| Selenium (Se)                         | mg/kg    | < 3   | NONE          | < 3          |  |  |  |
| Vanadium (V)                          | mg/kg    | < 2   | NONE          | 41           |  |  |  |
| Zinc (Zn)                             | mg/kg    | < 3   | MCERTS        | 106          |  |  |  |
| Total Phenols (monohydric)            | mg/kg    | < 2   | NONE          | < 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: Marcus Jones

RL: Reporting Limit

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

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



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



| Soil Analysis Certificate - Speciated PAHs |                 |               |  |  |  |  |
|--------------------------------------------|-----------------|---------------|--|--|--|--|
| QTS Environmental Report No: 15-33511      | Date Sampled    | 15/07/15      |  |  |  |  |
| Soils Ltd                                  | Time Sampled    | None Supplied |  |  |  |  |
| Site Reference: Ranelagh Road              | TP / BH No      | Plot 77       |  |  |  |  |
| Project / Job Ref: 14933                   | Additional Refs | None Supplied |  |  |  |  |
| Order No: None Supplied                    | Depth (m)       | 0.10 - 0.40   |  |  |  |  |
| Reporting Date: 22/07/2015                 | QTSE Sample No  | 157623        |  |  |  |  |

| Determinand            | Unit  | RL    | Accreditation |       |  |  |  |
|------------------------|-------|-------|---------------|-------|--|--|--|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | < 1.6 |  |  |  |

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

| Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3 |                                                               |                          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
|------------------------------------------------------------------|---------------------------------------------------------------|--------------------------|---------------|----------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------|--|-------------------------------------------|--|--|----------------------|---------------------------------------------------------------|--------------------------|----|----|----|----|----|-----|---|----|----|---|----|----|-----|----|----|-----|----|----|----|----|----|----|-----------------|-----------------|
| QTS Environmental Report No: 15-33511                            |                                                               | Date Sampled             | 15/07/15      |          |        | <table border="1"> <thead> <tr> <th colspan="3">Landfill Waste Acceptance Criteria Limits</th> </tr> <tr> <th>Inert Waste Landfill</th> <th>Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill</th> <th>Hazardous Waste Landfill</th> </tr> </thead> <tbody> <tr> <td>3%</td> <td>5%</td> <td>6%</td> </tr> <tr> <td>--</td> <td>--</td> <td>10%</td> </tr> <tr> <td>6</td> <td>--</td> <td>--</td> </tr> <tr> <td>1</td> <td>--</td> <td>--</td> </tr> <tr> <td>500</td> <td>--</td> <td>--</td> </tr> <tr> <td>100</td> <td>--</td> <td>--</td> </tr> <tr> <td>--</td> <td>&gt;6</td> <td>--</td> </tr> <tr> <td>--</td> <td>To be evaluated</td> <td>To be evaluated</td> </tr> </tbody> </table> |                                                                                      |        |  | Landfill Waste Acceptance Criteria Limits |  |  | Inert Waste Landfill | Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill | Hazardous Waste Landfill | 3% | 5% | 6% | -- | -- | 10% | 6 | -- | -- | 1 | -- | -- | 500 | -- | -- | 100 | -- | -- | -- | >6 | -- | -- | To be evaluated | To be evaluated |
| Landfill Waste Acceptance Criteria Limits                        |                                                               |                          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Inert Waste Landfill                                             | Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill | Hazardous Waste Landfill |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| 3%                                                               | 5%                                                            | 6%                       |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| --                                                               | --                                                            | 10%                      |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| 6                                                                | --                                                            | --                       |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| 1                                                                | --                                                            | --                       |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| 500                                                              | --                                                            | --                       |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| 100                                                              | --                                                            | --                       |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| --                                                               | >6                                                            | --                       |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| --                                                               | To be evaluated                                               | To be evaluated          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Soils Ltd                                                        |                                                               | Time Sampled             | None Supplied |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Site Reference: Ranelagh Road                                    |                                                               | TP / BH No               | Plot 77       |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Project / Job Ref: 14933                                         |                                                               | Additional Refs          | None Supplied |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Order No: None Supplied                                          |                                                               | Depth (m)                | 0.10 - 0.40   |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Reporting Date: 22/07/2015                                       |                                                               | QTSE Sample No           | 157623        |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Determinand                                                      | Unit                                                          | MDL                      |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| TOC <sup>MU</sup>                                                | %                                                             | < 0.1                    | 1.1           |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Loss on Ignition                                                 | %                                                             | < 0.01                   | 2.40          |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| BTEX <sup>MU</sup>                                               | mg/kg                                                         | < 0.05                   | < 0.05        |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Sum of PCBs                                                      | mg/kg                                                         | < 0.7                    | < 0.7         |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Mineral Oil <sup>MU</sup>                                        | mg/kg                                                         | < 10                     | < 10          |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Total PAH <sup>MU</sup>                                          | mg/kg                                                         | < 1.7                    | < 1.7         |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| pH <sup>MU</sup>                                                 | pH Units                                                      | N/a                      | 7.9           |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Acid Neutralisation Capacity                                     | mol/kg (+/-)                                                  | < 1                      | 1             |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Eluate Analysis                                                  |                                                               |                          | 2:1 mg/l      | 8:1 mg/l |        | Cumulative 10:1 mg/kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg) |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Arsenic <sup>U</sup>                                             |                                                               | < 0.01                   | < 0.01        |          | < 0.2  | 0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 2                                                                                    | 25     |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Barium <sup>U</sup>                                              |                                                               | 0.05                     | < 0.02        |          | 0.2    | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 100                                                                                  | 300    |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Cadmium <sup>U</sup>                                             |                                                               | < 0.0005                 | < 0.0005      |          | < 0.02 | 0.04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                                                                                    | 5      |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Chromium <sup>U</sup>                                            |                                                               | < 0.005                  | < 0.005       |          | < 0.20 | 0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 10                                                                                   | 70     |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Copper <sup>U</sup>                                              |                                                               | < 0.01                   | < 0.01        |          | < 0.5  | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 50                                                                                   | 100    |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Mercury <sup>U</sup>                                             |                                                               | < 0.005                  | < 0.005       |          | < 0.01 | 0.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.2                                                                                  | 2      |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Molybdenum <sup>U</sup>                                          |                                                               | 0.008                    | 0.005         |          | < 0.1  | 0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 10                                                                                   | 30     |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Nickel <sup>U</sup>                                              |                                                               | < 0.007                  | < 0.007       |          | < 0.2  | 0.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 10                                                                                   | 40     |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Lead <sup>U</sup>                                                |                                                               | < 0.005                  | < 0.005       |          | < 0.2  | 0.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 10                                                                                   | 50     |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Antimony <sup>U</sup>                                            |                                                               | < 0.005                  | < 0.005       |          | < 0.06 | 0.06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.7                                                                                  | 5      |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Selenium <sup>U</sup>                                            |                                                               | < 0.005                  | < 0.005       |          | < 0.1  | 0.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.5                                                                                  | 7      |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Zinc <sup>U</sup>                                                |                                                               | < 0.005                  | < 0.005       |          | < 0.2  | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 50                                                                                   | 200    |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Chloride <sup>U</sup>                                            |                                                               | 41                       | 4             |          | 74     | 800                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 15000                                                                                | 25000  |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Fluoride <sup>U</sup>                                            |                                                               | 0.5                      | < 0.5         |          | < 1    | 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 150                                                                                  | 500    |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Sulphate <sup>U</sup>                                            |                                                               | 42                       | 6             |          | 96     | 1000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 20000                                                                                | 50000  |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| TDS                                                              |                                                               | 224                      | 87            |          | 1013   | 4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 60000                                                                                | 100000 |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Phenol Index                                                     |                                                               | < 0.01                   | < 0.01        |          | < 0.5  | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -                                                                                    | -      |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| DOC                                                              |                                                               | 8.9                      | 5.1           |          | 55     | 500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 800                                                                                  | 1000   |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Leach Test Information                                           |                                                               |                          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
|                                                                  |                                                               |                          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
|                                                                  |                                                               |                          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
|                                                                  |                                                               |                          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
|                                                                  |                                                               |                          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Sample Mass (kg)                                                 |                                                               |                          | 0.19          |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Dry Matter (%)                                                   |                                                               |                          | 91.2          |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Moisture (%)                                                     |                                                               |                          | 9.6           |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Stage 1                                                          |                                                               |                          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Volume Eluate L2 (litres)                                        |                                                               |                          | 0.33          |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
| Filtered Eluate VE1 (litres)                                     |                                                               |                          | 0.18          |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
|                                                                  |                                                               |                          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |
|                                                                  |                                                               |                          |               |          |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |        |  |                                           |  |  |                      |                                                               |                          |    |    |    |    |    |     |   |    |    |   |    |    |     |    |    |     |    |    |    |    |    |    |                 |                 |

Results are expressed on a dry weight basis, after correction for moisture content where applicable  
 Stated limits are for guidance only and QTS Environmental cannot be held responsible for any discrepancies with current legislation  
 M Denotes MCERTS accredited test  
 U Denotes ISO17025 accredited test



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| Soil Analysis Certificate - Sample Descriptions |  |
|-------------------------------------------------|--|
| QTS Environmental Report No: 15-33511           |  |
| Soils Ltd                                       |  |
| Site Reference: Ranelagh Road                   |  |
| Project / Job Ref: 14933                        |  |
| Order No: None Supplied                         |  |
| Reporting Date: 22/07/2015                      |  |

| QTSE Sample No | TP / BH No | Additional Refs | Depth (m)   | Moisture Content (%) | Sample Matrix Description             |
|----------------|------------|-----------------|-------------|----------------------|---------------------------------------|
| & 157623       | Plot 77    | None Supplied   | 0.10 - 0.40 | 8.8                  | Light brown clayey gravel with rubble |

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

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

& samples received in inappropriate containers for hydrocarbon analysis

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

**QTS Environmental Report No: 15-33511**

**Soils Ltd**

**Site Reference: Ranelagh Road**

**Project / Job Ref: 14933**

**Order No: None Supplied**

**Reporting Date: 22/07/2015**

| 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**



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## **QTS Environmental Report No: 15-33512**

**Site Reference:** Ranelagh Road

**Project / Job Ref:** 14933

**Order No:** None Supplied

**Sample Receipt Date:** 16/07/2015

**Sample Scheduled Date:** 16/07/2015

**Report Issue Number:** 1

**Reporting Date:** 21/07/2015

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



| Soil Analysis Certificate                    |                        |               |               |               |               |               |
|----------------------------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>QTS Environmental Report No: 15-33512</b> | <b>Date Sampled</b>    | 15/07/15      | 15/07/15      | 15/07/15      | 15/07/15      | 15/07/15      |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Ranelagh Road</b>         | <b>TP / BH No</b>      | Plot 74       | Plot 74       | Plot 75       | Plot 75       | Plot 76       |
| <b>Project / Job Ref: 14933</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>       | 0.60          | 1.00          | 0.60          | 1.10          | 0.60          |
| <b>Reporting Date: 21/07/2015</b>            | <b>QTSE Sample No</b>  | 157624        | 157625        | 157626        | 157627        | 157628        |

| Determinand                           | Unit     | RL    | Accreditation |       |       |       |       |       |
|---------------------------------------|----------|-------|---------------|-------|-------|-------|-------|-------|
| Asbestos Screen                       | N/a      | N/a   | ISO17025      |       |       |       |       |       |
| pH                                    | pH Units | N/a   | MCERTS        |       |       |       |       |       |
| Total Cyanide                         | mg/kg    | < 2   | NONE          |       |       |       |       |       |
| W/S Sulphate as SO <sub>4</sub> (2:1) | mg/l     | < 10  | MCERTS        |       |       |       |       |       |
| Sulphide                              | mg/kg    | < 5   | NONE          |       |       |       |       |       |
| Organic Matter                        | %        | < 0.1 | MCERTS        |       |       |       |       |       |
| Total Organic Carbon (TOC)            | %        | < 0.1 | MCERTS        |       |       |       |       |       |
| Arsenic (As)                          | mg/kg    | < 2   | MCERTS        | 11    | 5     | 8     | 8     | 7     |
| Barium (Ba)                           | mg/kg    | < 5   | NONE          | 72    | 75    | 67    | 75    | 78    |
| Beryllium (Be)                        | mg/kg    | < 0.5 | NONE          | 1     | 0.7   | 0.8   | 1.1   | 1     |
| W/S Boron                             | mg/kg    | < 1   | NONE          | < 1   | < 1   | < 1   | < 1   | < 1   |
| Cadmium (Cd)                          | mg/kg    | < 0.2 | MCERTS        | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| Chromium (Cr)                         | mg/kg    | < 2   | MCERTS        | 35    | 32    | 32    | 33    | 33    |
| Chromium (hexavalent)                 | mg/kg    | < 2   | NONE          |       |       |       |       |       |
| Copper (Cu)                           | mg/kg    | < 4   | MCERTS        | 22    | 16    | 17    | 20    | 20    |
| Lead (Pb)                             | mg/kg    | < 3   | MCERTS        | 20    | 16    | 17    | 18    | 16    |
| Mercury (Hg)                          | mg/kg    | < 1   | NONE          | < 1   | < 1   | < 1   | < 1   | < 1   |
| Nickel (Ni)                           | mg/kg    | < 3   | MCERTS        | 30    | 21    | 23    | 38    | 38    |
| Selenium (Se)                         | mg/kg    | < 3   | NONE          | < 3   | < 3   | < 3   | < 3   | < 3   |
| Vanadium (V)                          | mg/kg    | < 2   | NONE          | 59    | 46    | 48    | 53    | 53    |
| Zinc (Zn)                             | mg/kg    | < 3   | MCERTS        | 65    | 54    | 57    | 65    | 61    |
| Total Phenols (monohydric)            | mg/kg    | < 2   | NONE          |       |       |       |       |       |

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: Marcus Jones

RL: Reporting Limit

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

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

| Soil Analysis Certificate                    |                        |               |               |               |               |  |
|----------------------------------------------|------------------------|---------------|---------------|---------------|---------------|--|
| <b>QTS Environmental Report No: 15-33512</b> | <b>Date Sampled</b>    | 15/07/15      | 15/07/15      | 15/07/15      | 15/07/15      |  |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied |  |
| <b>Site Reference: Ranelagh Road</b>         | <b>TP / BH No</b>      | Plot 76       | Plot 77       | Plot 77       | TS A          |  |
| <b>Project / Job Ref: 14933</b>              | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied |  |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 1.00          | 0.65          | 1.00          | None Supplied |  |
| <b>Reporting Date: 21/07/2015</b>            | <b>QTSE Sample No</b>  | 157629        | 157630        | 157631        | 157632        |  |

| Determinand                           | Unit     | RL    | Accreditation |       |       |       |              |
|---------------------------------------|----------|-------|---------------|-------|-------|-------|--------------|
| Asbestos Screen                       | N/a      | N/a   | ISO17025      |       |       |       | Not Detected |
| pH                                    | pH Units | N/a   | MCERTS        |       |       |       | 8.1          |
| Total Cyanide                         | mg/kg    | < 2   | NONE          |       |       |       | < 2          |
| W/S Sulphate as SO <sub>4</sub> (2:1) | mg/l     | < 10  | MCERTS        |       |       |       | 45           |
| Sulphide                              | mg/kg    | < 5   | NONE          |       |       |       | < 5          |
| Organic Matter                        | %        | < 0.1 | MCERTS        |       |       |       | 4.4          |
| Total Organic Carbon (TOC)            | %        | < 0.1 | MCERTS        |       |       |       | 2.6          |
| Arsenic (As)                          | mg/kg    | < 2   | MCERTS        | 6     | 5     | 7     | 10           |
| Barium (Ba)                           | mg/kg    | < 5   | NONE          | 73    | 64    | 76    |              |
| Beryllium (Be)                        | mg/kg    | < 0.5 | NONE          | 0.8   | 0.7   | 0.9   | 0.7          |
| W/S Boron                             | mg/kg    | < 1   | NONE          | < 1   | < 1   | < 1   | < 1          |
| Cadmium (Cd)                          | mg/kg    | < 0.2 | MCERTS        | < 0.2 | < 0.2 | < 0.2 | 0.4          |
| Chromium (Cr)                         | mg/kg    | < 2   | MCERTS        | 25    | 24    | 26    | 19           |
| Chromium (hexavalent)                 | mg/kg    | < 2   | NONE          |       |       |       | < 2          |
| Copper (Cu)                           | mg/kg    | < 4   | MCERTS        | 16    | 15    | 18    | 34           |
| Lead (Pb)                             | mg/kg    | < 3   | MCERTS        | 15    | 17    | 14    | 154          |
| Mercury (Hg)                          | mg/kg    | < 1   | NONE          | < 1   | < 1   | < 1   | < 1          |
| Nickel (Ni)                           | mg/kg    | < 3   | MCERTS        | 29    | 21    | 28    | 18           |
| Selenium (Se)                         | mg/kg    | < 3   | NONE          | < 3   | < 3   | < 3   | < 3          |
| Vanadium (V)                          | mg/kg    | < 2   | NONE          | 37    | 40    | 43    | 31           |
| Zinc (Zn)                             | mg/kg    | < 3   | MCERTS        | 51    | 49    | 53    | 141          |
| Total Phenols (monohydric)            | mg/kg    | < 2   | NONE          |       |       |       | < 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: Marcus Jones

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: 15-33512      |  | Date Sampled    | 15/07/15      |  |  |  |
| Soils Ltd                                  |  | Time Sampled    | None Supplied |  |  |  |
| Site Reference: Ranelagh Road              |  | TP / BH No      | TS A          |  |  |  |
| Project / Job Ref: 14933                   |  | Additional Refs | None Supplied |  |  |  |
| Order No: None Supplied                    |  | Depth (m)       | None Supplied |  |  |  |
| Reporting Date: 21/07/2015                 |  | QTSE Sample No  | 157632        |  |  |  |

| Determinand            | Unit  | RL    | Accreditation |       |  |  |  |
|------------------------|-------|-------|---------------|-------|--|--|--|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | < 0.1 |  |  |  |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | < 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 - Sample Descriptions |  |
|-------------------------------------------------|--|
| QTS Environmental Report No: 15-33512           |  |
| Soils Ltd                                       |  |
| Site Reference: Ranelagh Road                   |  |
| Project / Job Ref: 14933                        |  |
| Order No: None Supplied                         |  |
| Reporting Date: 21/07/2015                      |  |

| QTSE Sample No | TP / BH No | Additional Refs | Depth (m)     | Moisture Content (%) | Sample Matrix Description |
|----------------|------------|-----------------|---------------|----------------------|---------------------------|
| 157624         | Plot 74    | None Supplied   | 0.60          | 15.1                 | Light brown clay          |
| 157625         | Plot 74    | None Supplied   | 1.00          | 14.6                 | Light brown clay          |
| 157626         | Plot 75    | None Supplied   | 0.60          | 15.5                 | Light brown clay          |
| 157627         | Plot 75    | None Supplied   | 1.10          | 16.4                 | Light brown clay          |
| 157628         | Plot 76    | None Supplied   | 0.60          | 14.7                 | Light brown clay          |
| 157629         | Plot 76    | None Supplied   | 1.00          | 13.5                 | Light brown clay          |
| 157630         | Plot 77    | None Supplied   | 0.65          | 12.7                 | Light brown clay          |
| 157631         | Plot 77    | None Supplied   | 1.00          | 15.1                 | Light brown clay          |
| 157632         | TS A       | None Supplied   | None Supplied | 18.8                 | Brown clayey gravel       |

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

Insufficient Sample <sup>1/S</sup>

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

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

**QTS Environmental Report No: 15-33512**

**Soils Ltd**

**Site Reference: Ranelagh Road**

**Project / Job Ref: 14933**

**Order No: None Supplied**

**Reporting Date: 21/07/2015**

| 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**



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## **QTS Environmental Report No: 15-33513**

**Site Reference:** Ranelagh Road

**Project / Job Ref:** 14933

**Order No:** None Supplied

**Sample Receipt Date:** 16/07/2015

**Sample Scheduled Date:** 16/07/2015

**Report Issue Number:** 1

**Reporting Date:** 21/07/2015

**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**



| Leachate Analysis Certificate                |                        |               |               |               |  |  |
|----------------------------------------------|------------------------|---------------|---------------|---------------|--|--|
| <b>QTS Environmental Report No: 15-33513</b> | <b>Date Sampled</b>    | 15/07/15      | 15/07/15      | 15/07/15      |  |  |
| <b>Soils Ltd</b>                             | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied |  |  |
| <b>Site Reference: Ranelagh Road</b>         | <b>TP / BH No</b>      | Plot 74       | Plot 75       | Plot 76       |  |  |
| <b>Project / Job Ref: 14933</b>              | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied |  |  |
| <b>Order No: None Supplied</b>               | <b>Depth (m)</b>       | 0.40          | 0.30 - 0.50   | 0.10 - 0.30   |  |  |
| <b>Reporting Date: 21/07/2015</b>            | <b>QTSE Sample No</b>  | 157633        | 157634        | 157635        |  |  |

| Determinand | Unit | RL     | Accreditation |        |        |        |  |  |
|-------------|------|--------|---------------|--------|--------|--------|--|--|
| Arsenic     | ug/l | < 5    | ISO17025      | < 5    | < 5    | 6      |  |  |
| Barium      | ug/l | < 5    | ISO17025      | 7      | 8      | 18     |  |  |
| Beryllium   | ug/l | < 3    | ISO17025      | < 3    | < 3    | < 3    |  |  |
| Boron       | ug/l | < 5    | ISO17025      | 7      | < 5    | < 5    |  |  |
| Cadmium     | ug/l | < 0.4  | ISO17025      | < 0.4  | < 0.4  | < 0.4  |  |  |
| Chromium    | ug/l | < 5    | ISO17025      | < 5    | < 5    | < 5    |  |  |
| Copper      | ug/l | < 5    | ISO17025      | < 5    | < 5    | < 5    |  |  |
| Lead        | ug/l | < 5    | ISO17025      | < 5    | < 5    | < 5    |  |  |
| Mercury     | ug/l | < 0.05 | ISO17025      | < 0.05 | < 0.05 | < 0.05 |  |  |
| Nickel      | ug/l | < 5    | ISO17025      | < 5    | < 5    | < 5    |  |  |
| Selenium    | ug/l | < 5    | ISO17025      | < 5    | < 5    | < 5    |  |  |
| Vanadium    | ug/l | < 5    | ISO17025      | 8      | < 5    | 7      |  |  |
| Zinc        | ug/l | < 2    | ISO17025      | 3      | < 2    | < 2    |  |  |

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

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

**QTS Environmental Report No: 15-33513**

**Soils Ltd**

**Site Reference: Ranelagh Road**

**Project / Job Ref: 14933**

**Order No: None Supplied**

**Reporting Date: 21/07/2015**

| Matrix   | Analysed On | Determinand                                                                                                                                     | Brief Method Description                                                                                                                    | Method No |
|----------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Water    | UF          | Alkalinity                                                                                                                                      | Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point                                 | E103      |
| Water    | UF          | BTEX                                                                                                                                            | Determination of BTEX by headspace GC-MS                                                                                                    | E101      |
| Water    | F           | Cations                                                                                                                                         | Determination of cations by filtration followed by ICP-MS                                                                                   | E102      |
| Water    | UF          | Chemical Oxygen Demand (COD)                                                                                                                    | Determination using a COD reactor followed by colorimetry                                                                                   | E112      |
| Water    | F           | Chloride                                                                                                                                        | Determination of chloride by filtration & analysed by ion chromatography                                                                    | E109      |
| Water    | F           | Chromium - Hexavalent                                                                                                                           | Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry                            | E116      |
| Water    | UF          | Cyanide - Complex                                                                                                                               | Determination of complex cyanide by distillation followed by colorimetry                                                                    | E115      |
| Water    | UF          | Cyanide - Free                                                                                                                                  | Determination of free cyanide by distillation followed by colorimetry                                                                       | E115      |
| Water    | UF          | Cyanide - Total                                                                                                                                 | Determination of total cyanide by distillation followed by colorimetry                                                                      | E115      |
| Water    | UF          | Cyclohexane Extractable Matter (CEM)                                                                                                            | Gravimetrically determined through liquid:liquid extraction with cyclohexane                                                                | E111      |
| Water    | F           | Diesel Range Organics (C10 - C24)                                                                                                               | Determination of liquid:liquid extraction with hexane followed by GC-FID                                                                    | E104      |
| Water    | F           | Dissolved Organic Content (DOC)                                                                                                                 | Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detection                                  | E110      |
| Water    | UF          | Electrical Conductivity                                                                                                                         | Determination of electrical conductivity by electrometric measurement                                                                       | E123      |
| Water    | F           | EPH (C10 - C40)                                                                                                                                 | Determination of liquid:liquid extraction with hexane followed by GC-FID                                                                    | E104      |
| Water    | F           | EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)                                                                                   | Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS                         | E104      |
| Water    | F           | Fluoride                                                                                                                                        | Determination of Fluoride by filtration & analysed by ion chromatography                                                                    | E109      |
| Water    | F           | Hardness                                                                                                                                        | Determination of Ca and Mg by ICP-MS followed by calculation                                                                                | E102      |
| Leachate | F           | Leachate Preparation - NRA                                                                                                                      | Based on National Rivers Authority leaching test 1994                                                                                       | E301      |
| Leachate | F           | Leachate Preparation - WAC                                                                                                                      | Based on BS EN 12457 Pt1, 2, 3                                                                                                              | E302      |
| Water    | F           | Metals                                                                                                                                          | Determination of metals by filtration followed by ICP-MS                                                                                    | E102      |
| Water    | F           | Mineral Oil (C10 - C40)                                                                                                                         | Determination of liquid:liquid extraction with hexane followed by GI-FID                                                                    | E104      |
| Water    | F           | Nitrate                                                                                                                                         | Determination of nitrate by filtration & analysed by ion chromatography                                                                     | E109      |
| Water    | UF          | Monohydric Phenol                                                                                                                               | Determination of phenols by distillation followed by colorimetry                                                                            | E121      |
| Water    | F           | PAH - Speciated (EPA 16)                                                                                                                        | Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS                      | E105      |
| Water    | F           | PCB - 7 Congeners                                                                                                                               | Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS                      | E108      |
| Water    | UF          | Petroleum Ether Extract (PEE)                                                                                                                   | Gravimetrically determined through liquid:liquid extraction with petroleum ether                                                            | E111      |
| Water    | UF          | pH                                                                                                                                              | Determination of pH by electrometric measurement                                                                                            | E107      |
| Water    | F           | Phosphate                                                                                                                                       | Determination of phosphate by filtration & analysed by ion chromatography                                                                   | E109      |
| Water    | UF          | Redox Potential                                                                                                                                 | Determination of redox potential by electrometric measurement                                                                               | E113      |
| Water    | F           | Sulphate (as SO4)                                                                                                                               | Determination of sulphate by filtration & analysed by ion chromatography                                                                    | E109      |
| Water    | UF          | Sulphide                                                                                                                                        | Determination of sulphide by distillation followed by colorimetry                                                                           | E118      |
| Water    | F           | SVOC                                                                                                                                            | Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS    | E106      |
| Water    | UF          | Toluene Extractable Matter (TEM)                                                                                                                | Gravimetrically determined through liquid:liquid extraction with toluene                                                                    | E111      |
| Water    | UF          | Total Organic Carbon (TOC)                                                                                                                      | Low heat with persulphate addition followed by IR detection                                                                                 | E110      |
| Water    | F           | TPH CWG (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 liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS | E104      |
| Water    | F           | 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 liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS | E104      |
| Water    | UF          | VOCs                                                                                                                                            | Determination of volatile organic compounds by headspace GC-MS                                                                              | E101      |
| Water    | UF          | VPH (C6-C8 & C8-C10)                                                                                                                            | Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID                                                                   | E101      |

## Key

**F Filtered**  
**UF Unfiltered**



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## **QTS Environmental Report No: 15-33815**

**Site Reference:** Ranelagh Road

**Project / Job Ref:** 14933

**Order No:** None Supplied

**Sample Receipt Date:** 16/07/2015

**Sample Scheduled Date:** 23/07/2015

**Report Issue Number:** 1

**Reporting Date:** 29/07/2015

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



| Leachate Analysis Certificate         |  |                 |               |  |  |  |
|---------------------------------------|--|-----------------|---------------|--|--|--|
| QTS Environmental Report No: 15-33815 |  | Date Sampled    | 15/07/15      |  |  |  |
| Soils Ltd                             |  | Time Sampled    | None Supplied |  |  |  |
| Site Reference: Ranelagh Road         |  | TP / BH No      | TS A          |  |  |  |
| Project / Job Ref: 14933              |  | Additional Refs | 157632        |  |  |  |
| Order No: None Supplied               |  | Depth (m)       | None Supplied |  |  |  |
| Reporting Date: 29/07/2015            |  | QTSE Sample No  | 158964        |  |  |  |

| Determinand | Unit | RL     | Accreditation |        |  |  |  |
|-------------|------|--------|---------------|--------|--|--|--|
| Arsenic     | ug/l | < 5    | ISO17025      | 5      |  |  |  |
| Barium      | ug/l | < 5    | ISO17025      | 61     |  |  |  |
| Beryllium   | ug/l | < 3    | ISO17025      | < 3    |  |  |  |
| Boron       | ug/l | < 5    | ISO17025      | 13     |  |  |  |
| Cadmium     | ug/l | < 0.4  | ISO17025      | < 0.4  |  |  |  |
| Chromium    | ug/l | < 5    | ISO17025      | < 5    |  |  |  |
| Copper      | ug/l | < 5    | ISO17025      | 12     |  |  |  |
| Lead        | ug/l | < 5    | ISO17025      | < 5    |  |  |  |
| Mercury     | ug/l | < 0.05 | ISO17025      | < 0.05 |  |  |  |
| Nickel      | ug/l | < 5    | ISO17025      | < 5    |  |  |  |
| Selenium    | ug/l | < 5    | ISO17025      | < 5    |  |  |  |
| Vanadium    | ug/l | < 5    | ISO17025      | 10     |  |  |  |
| Zinc        | ug/l | < 2    | ISO17025      | 50     |  |  |  |

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

| <b>Soil Analysis Certificate - Methodology &amp; Miscellaneous Information</b> |  |
|--------------------------------------------------------------------------------|--|
| <b>QTS Environmental Report No: 15-33815</b>                                   |  |
| <b>Soils Ltd</b>                                                               |  |
| <b>Site Reference: Ranelagh Road</b>                                           |  |
| <b>Project / Job Ref: 14933</b>                                                |  |
| <b>Order No: None Supplied</b>                                                 |  |
| <b>Reporting Date: 29/07/2015</b>                                              |  |

| Matrix   | Analysed On | Determinand                                                                                                                                     | Brief Method Description                                                                                                                    | Method No |
|----------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Water    | UF          | Alkalinity                                                                                                                                      | Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point                                 | E103      |
| Water    | UF          | BTEX                                                                                                                                            | Determination of BTEX by headspace GC-MS                                                                                                    | E101      |
| Water    | F           | Cations                                                                                                                                         | Determination of cations by filtration followed by ICP-MS                                                                                   | E102      |
| Water    | UF          | Chemical Oxygen Demand (COD)                                                                                                                    | Determination using a COD reactor followed by colorimetry                                                                                   | E112      |
| Water    | F           | Chloride                                                                                                                                        | Determination of chloride by filtration & analysed by ion chromatography                                                                    | E109      |
| Water    | F           | Chromium - Hexavalent                                                                                                                           | Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry                            | E116      |
| Water    | UF          | Cyanide - Complex                                                                                                                               | Determination of complex cyanide by distillation followed by colorimetry                                                                    | E115      |
| Water    | UF          | Cyanide - Free                                                                                                                                  | Determination of free cyanide by distillation followed by colorimetry                                                                       | E115      |
| Water    | UF          | Cyanide - Total                                                                                                                                 | Determination of total cyanide by distillation followed by colorimetry                                                                      | E115      |
| Water    | UF          | Cyclohexane Extractable Matter (CEM)                                                                                                            | Gravimetrically determined through liquid:liquid extraction with cyclohexane                                                                | E111      |
| Water    | F           | Diesel Range Organics (C10 - C24)                                                                                                               | Determination of liquid:liquid extraction with hexane followed by GC-FID                                                                    | E104      |
| Water    | F           | Dissolved Organic Content (DOC)                                                                                                                 | Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detection                                  | E110      |
| Water    | UF          | Electrical Conductivity                                                                                                                         | Determination of electrical conductivity by electrometric measurement                                                                       | E123      |
| Water    | F           | EPH (C10 - C40)                                                                                                                                 | Determination of liquid:liquid extraction with hexane followed by GC-FID                                                                    | E104      |
| Water    | F           | EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)                                                                                   | Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS                         | E104      |
| Water    | F           | Fluoride                                                                                                                                        | Determination of Fluoride by filtration & analysed by ion chromatography                                                                    | E109      |
| Water    | F           | Hardness                                                                                                                                        | Determination of Ca and Mg by ICP-MS followed by calculation                                                                                | E102      |
| Leachate | F           | Leachate Preparation - NRA                                                                                                                      | Based on National Rivers Authority leaching test 1994                                                                                       | E301      |
| Leachate | F           | Leachate Preparation - WAC                                                                                                                      | Based on BS EN 12457 Pt1, 2, 3                                                                                                              | E302      |
| Water    | F           | Metals                                                                                                                                          | Determination of metals by filtration followed by ICP-MS                                                                                    | E102      |
| Water    | F           | Mineral Oil (C10 - C40)                                                                                                                         | Determination of liquid:liquid extraction with hexane followed by GC-FID                                                                    | E104      |
| Water    | F           | Nitrate                                                                                                                                         | Determination of nitrate by filtration & analysed by ion chromatography                                                                     | E109      |
| Water    | UF          | Monohydric Phenol                                                                                                                               | Determination of phenols by distillation followed by colorimetry                                                                            | E121      |
| Water    | F           | PAH - Speciated (EPA 16)                                                                                                                        | Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS                      | E105      |
| Water    | F           | PCB - 7 Congeners                                                                                                                               | Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS                      | E108      |
| Water    | UF          | Petroleum Ether Extract (PEE)                                                                                                                   | Gravimetrically determined through liquid:liquid extraction with petroleum ether                                                            | E111      |
| Water    | UF          | pH                                                                                                                                              | Determination of pH by electrometric measurement                                                                                            | E107      |
| Water    | F           | Phosphate                                                                                                                                       | Determination of phosphate by filtration & analysed by ion chromatography                                                                   | E109      |
| Water    | UF          | Redox Potential                                                                                                                                 | Determination of redox potential by electrometric measurement                                                                               | E113      |
| Water    | F           | Sulphate (as SO4)                                                                                                                               | Determination of sulphate by filtration & analysed by ion chromatography                                                                    | E109      |
| Water    | UF          | Sulphide                                                                                                                                        | Determination of sulphide by distillation followed by colorimetry                                                                           | E118      |
| Water    | F           | SVOC                                                                                                                                            | Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS    | E106      |
| Water    | UF          | Toluene Extractable Matter (TEM)                                                                                                                | Gravimetrically determined through liquid:liquid extraction with toluene                                                                    | E111      |
| Water    | UF          | Total Organic Carbon (TOC)                                                                                                                      | Low heat with persulphate addition followed by IR detection                                                                                 | E110      |
| Water    | F           | TPH CWG (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 liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS | E104      |
| Water    | F           | 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 liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS | E104      |
| Water    | UF          | VOCs                                                                                                                                            | Determination of volatile organic compounds by headspace GC-MS                                                                              | E101      |
| Water    | UF          | VPH (C6-C8 & C8-C10)                                                                                                                            | Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID                                                                   | E101      |

Key

**F Filtered**  
**UF Unfiltered**