

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

7th 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 15th 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 Location : Depth (m bgl)	Reason tested	Tests Scheduled
Plot 74 :0.60	Proposed Formation Level	CLEA Metals Suite (Including Lead)
Plot 75 : 0.60		
Plot 76 : 0.60		
Plot 77 : 0.65		
Plot 74 : 1.00	500mm below proposed formation 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

Sample ID Location : Depth(m bgl)	Reason tested	Tests Scheduled
Plot 74 : 0.40	Material to be stripped and reused on site.	CLEA Metals Suite – Leachate (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

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

Sample ID Location : Depth(m bgl)	Reason tested	Tests Scheduled
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

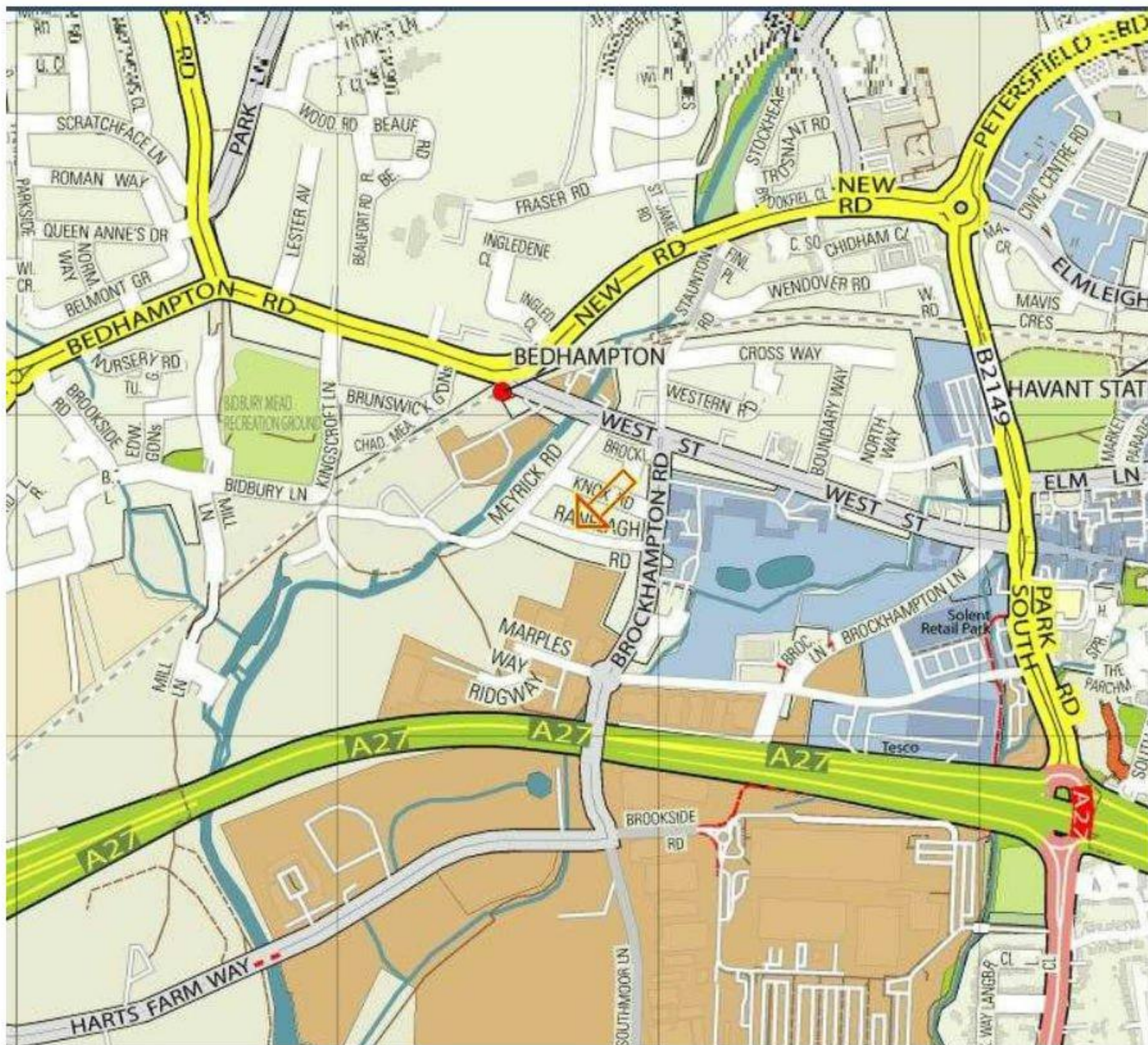


Figure number

1

Title

Site Location Map

Project

Land South of Ranelagh Road

Date

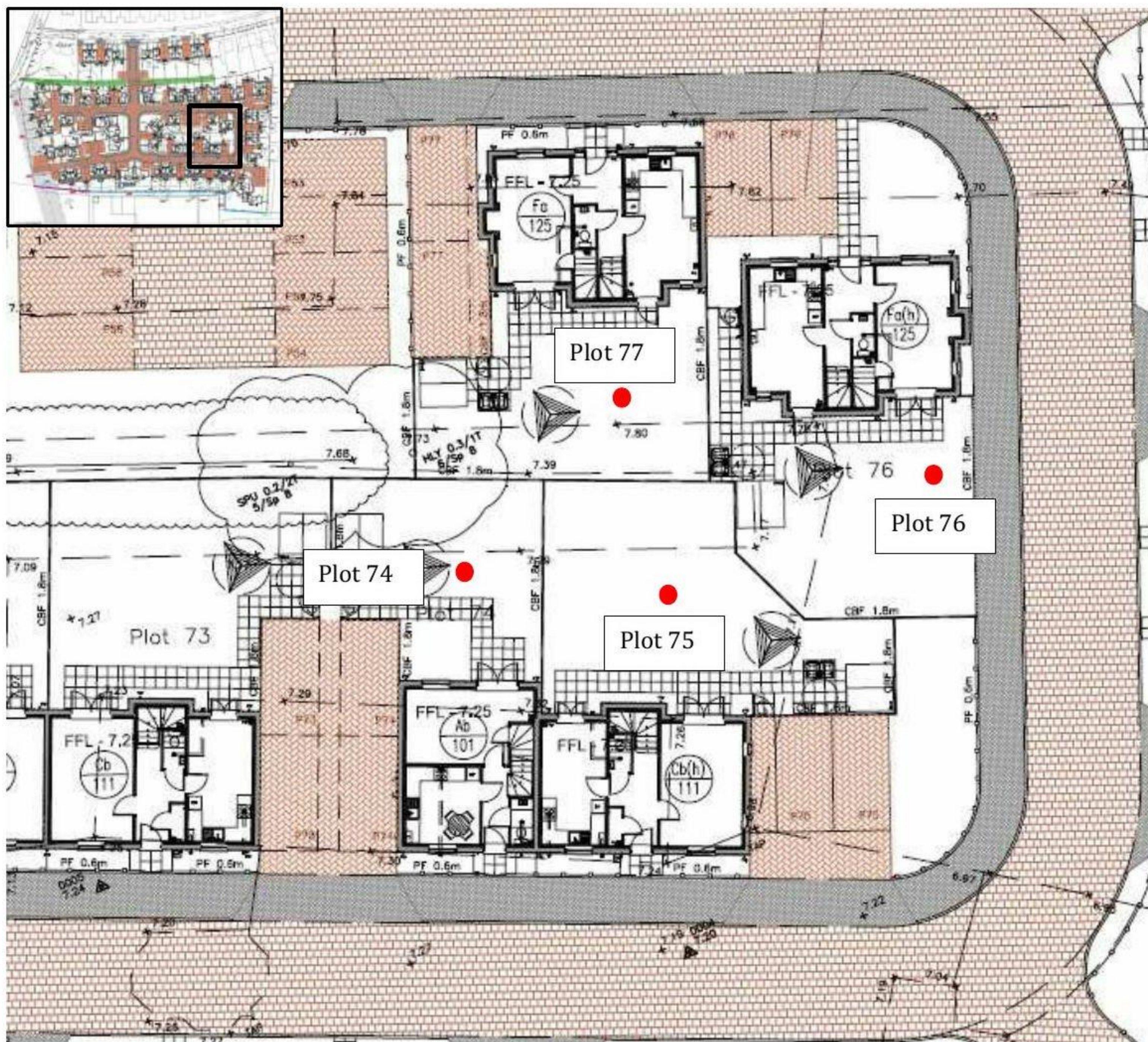
July 2015

Client

Foreman Homes

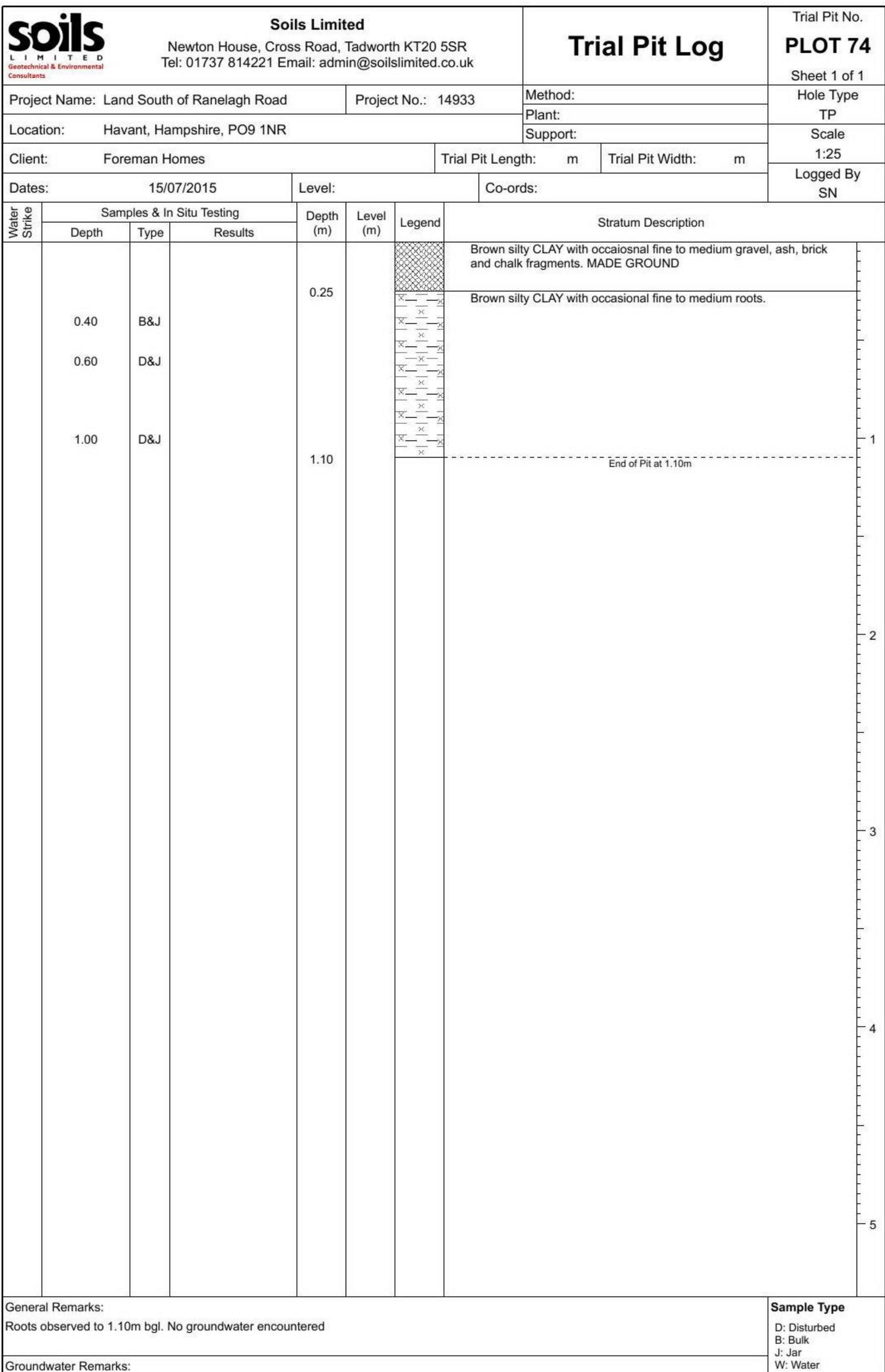
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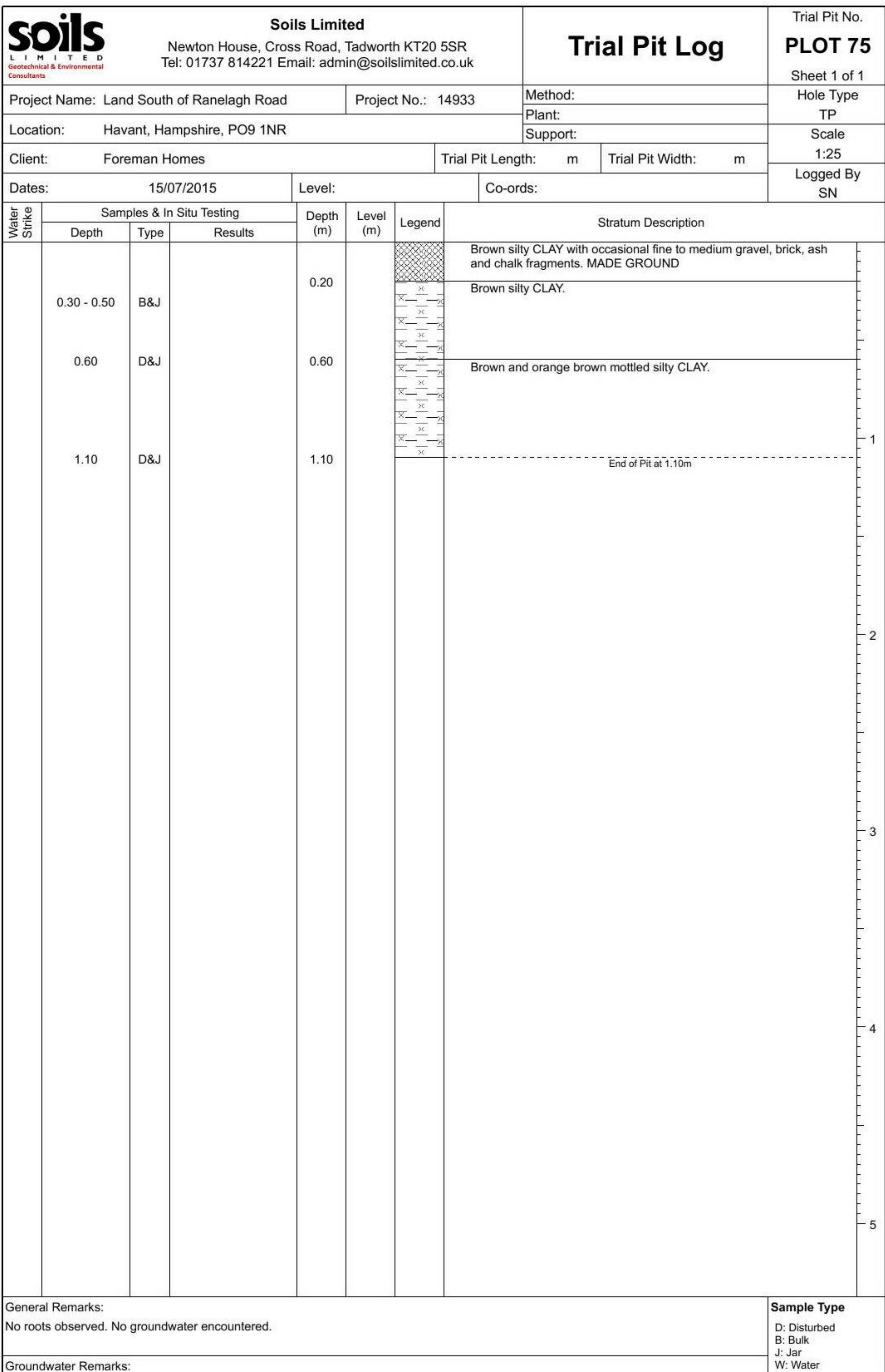
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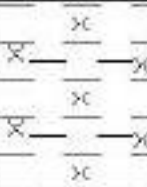
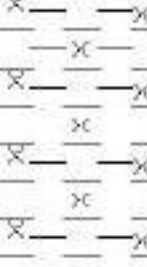
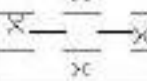


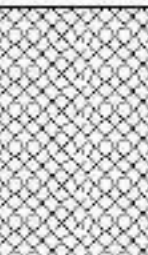
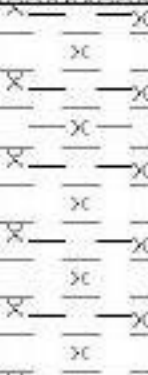
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APPENDIX A-Field Logs





		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. PLOT 76 Sheet 1 of 1	
Project Name: Land South of Ranelagh Road				Project No.: 14933		Method:		Hole Type TP
Location: Havant, Hampshire, PO9 1NR						Plant:		
Client: Foreman Homes				Trial Pit Length: m		Trial Pit Width: m		Scale 1:25
Dates: 15/07/2015				Level:		Co-ords:		Logged By SN
Water Strike	Samples & In Situ Testing			Depth (m)	Level (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: No roots observed. No groundwater encountered.								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks:								

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. PLOT 77 Sheet 1 of 1	
Project Name: Land South of Ranelagh Road				Project No.: 14933		Method:		Hole Type TP
Location: Havant, Hampshire, PO9 1NR						Plant:		
Client: Foreman Homes				Trial Pit Length: m		Trial Pit Width: m		Scale 1:25
Dates: 15/07/2015				Level:		Co-ords:		Logged By SN
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.10 - 0.40	B&J		0.40			Brown silty CLAY with occasional gravel, brick, ash and chalk fragments . MADE GROUND	
	0.65	D&J					Orange brown mottled silty CLAY.	
	1.00	D&J		1.00				
							End of Pit at 1.00m	
General Remarks: Sample Type No roots observed. No groundwater encountered. D: Disturbed B: Bulk J: Jar 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).

The CLEA Guidance comprises the following documents:

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

The CLEA guidance and tools:

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

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- Critical receptor is a young female child (zero to six years old)
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- 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.
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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.

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

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

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

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

1.8 Detailed Quantitative Risk Assessments (DQRA)

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

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

1.9 Current Criteria

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

1.10 Statistical Tests

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

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

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

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

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

Treatment of Hot-Spots

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

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

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 ⁻¹)																						
	1	Site Specific Assessment Criteria (SSAC) (Soils Limited)																						
	2	2014: Category 4 Screening Level (C4SL) (Contaminated Land: Application in Real Environment (CL:ARE), 2014)																						
	3	2012: Soil Guideline Value (SGV) (Environment Agency, 2009)																						
	4	2015: Suitable 4 Use Level (S4UL) (Nathanail <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



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

QTS Environmental Report No: 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

A handwritten signature in black ink, appearing to read 'R Jarvis'.

Authorised by:

Kevin Old
Director

On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'K Old'.

Soil Analysis Certificate						
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				
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 ₄ (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 ⁽⁵⁾



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>>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 ^{MU}	%	< 0.1	1.1																																				
Loss on Ignition	%	< 0.01	2.40																																				
BTEX ^{MU}	mg/kg	< 0.05	< 0.05																																				
Sum of PCBs	mg/kg	< 0.7	< 0.7																																				
Mineral Oil ^{MU}	mg/kg	< 10	< 10																																				
Total PAH ^{MU}	mg/kg	< 1.7	< 1.7																																				
pH ^{MU}	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 ^U		< 0.01	< 0.01		< 0.2	0.5	2	25																															
Barium ^U		0.05	< 0.02		0.2	20	100	300																															
Cadmium ^U		< 0.0005	< 0.0005		< 0.02	0.04	1	5																															
Chromium ^U		< 0.005	< 0.005		< 0.20	0.5	10	70																															
Copper ^U		< 0.01	< 0.01		< 0.5	2	50	100																															
Mercury ^U		< 0.005	< 0.005		< 0.01	0.01	0.2	2																															
Molybdenum ^U		0.008	0.005		< 0.1	0.5	10	30																															
Nickel ^U		< 0.007	< 0.007		< 0.2	0.4	10	40																															
Lead ^U		< 0.005	< 0.005		< 0.2	0.5	10	50																															
Antimony ^U		< 0.005	< 0.005		< 0.06	0.06	0.7	5																															
Selenium ^U		< 0.005	< 0.005		< 0.1	0.1	0.5	7																															
Zinc ^U		< 0.005	< 0.005		< 0.2	4	50	200																															
Chloride ^U		41	4		74	800	15000	25000																															
Fluoride ^U		0.5	< 0.5		< 1	10	150	500																															
Sulphate ^U		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 ^{1/5}

& 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



Craig Morrison
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SO23 0LB



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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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Soil Analysis Certificate						
QTS Environmental Report No: 15-33512	Date Sampled	15/07/15	15/07/15	15/07/15	15/07/15	15/07/15
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Ranelagh Road	TP / BH No	Plot 74	Plot 74	Plot 75	Plot 75	Plot 76
Project / Job Ref: 14933	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.60	1.00	0.60	1.10	0.60
Reporting Date: 21/07/2015	QTSE Sample No	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 ₄ (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 ⁽⁵⁾



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Soil Analysis Certificate						
QTS Environmental Report No: 15-33512	Date Sampled	15/07/15	15/07/15	15/07/15	15/07/15	
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Ranelagh Road	TP / BH No	Plot 76	Plot 77	Plot 77	TS A	
Project / Job Ref: 14933	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: None Supplied	Depth (m)	1.00	0.65	1.00	None Supplied	
Reporting Date: 21/07/2015	QTSE Sample No	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 ₄ (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 ⁽⁵⁾



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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 ^{1/S}

Unsuitable Sample ^{U/S}

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



Craig Morrison
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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

A handwritten signature in black ink, appearing to read 'R Jarvis'.

Authorised by:

Kevin Old
Director

On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'K Old'.



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Leachate Analysis Certificate						
QTS Environmental Report No: 15-33513	Date Sampled	15/07/15	15/07/15	15/07/15		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Ranelagh Road	TP / BH No	Plot 74	Plot 75	Plot 76		
Project / Job Ref: 14933	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	0.40	0.30 - 0.50	0.10 - 0.30		
Reporting Date: 21/07/2015	QTSE Sample No	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 ⁽⁵⁾



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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

A handwritten signature in black ink, appearing to read 'R Jarvis'.

Authorised by:

Kevin Old
Director

On behalf of QTS Environmental Ltd

A handwritten signature in black ink, appearing to read 'Kevin Old'.



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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 ⁽⁵⁾

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

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 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