

VALIDATION REPORT

Former Agricultural Works, Station Road, Baldock, SG7 5BS

CON01-BALD-029

Site Address:
Former Agricultural Works
Station Road
Baldock
Essex
CM15 0TR

Report Date:
8 August 2017

Version Number:
Version 1

Customer:
Weston Homes PLC
The Stansted Centre
Takeley
Essex
CM22 6PU.

Prepared By:
Stansted Environmental Services Ltd
The Stansted Centre
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DOCUMENT CONTROL

Publication Title	Validation Report Former Agricultural Works, Station Road, Baldock, SG7 5BS
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Gavin Greenwood has over 30 years' experience as a GeoEnvironmental Engineer working for a variety of consultants and contractors within the contaminated land field.

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Associate Director (Environment)

Silvio Petrasso has been undertaking contaminated land investigations as part of brownfield land redevelopments for 12 years, as well as offering other construction related consultancy services

Approved By:

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Managing Director of Stansted Environmental Services Ltd

John Carpenter is a Chartered Member of the Chartered Institute of Environmental Health and has extensive experience in dealing with contaminated land.

Issue Status	Version 1
Date	8 August 2017

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1. INTRODUCTION

Stansted Environmental Services Limited (SES) has been commissioned by Weston Homes plc to prepare a validation report for the Former Agricultural Works, Station Road, Baldock, SG7 5BS. It is understood that the site is to be redeveloped to provide fifty residential dwellings with associated car parking, private gardens and landscaped areas.

This validation report is for the northern part of the site as shown in Appendix A.

1.1 Planning Status

The Planning Condition reference for the development site is 15/031357/1 granted 5th August 2016 which contains Condition 16 relating specifically to contamination and has been reproduced below:

> 16 **No development approved by this planning permission shall take place until a remediation strategy that includes the following components to deal with the risks associated with contamination of the site shall each be submitted to and approved, in writing, by the local planning authority:**
> **1. A preliminary risk assessment which has identified:**
> **- all previous uses**
> **- potential contaminants associated with those uses**
> **- a conceptual model of the site indicating sources, pathways and receptors**
> **- potentially unacceptable risks arising from contamination at the site**
>
> **2. A site investigation scheme, based on (1) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site.**
>
> **3. The results of the site investigation and the detailed risk assessment referred to in (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.**
>
> **A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in (3) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.**
>
> **Any changes to these components require the express written consent of the local planning authority. The scheme shall be implemented as approved.**

This validation report refers to the northern part of the site. A second validation report will be issued for the southern part of the site, including Plots 1 and 2, in due course.

1.2 National and Local Policy and Guidance

This Validation Report has been prepared in line with UK and Local guidance as evidence to discharge the Planning Condition relating to land contamination. The guidance includes;

- Model Procedures for the Management of Contaminated Land – Contaminated Land Report 11 (CLR11).

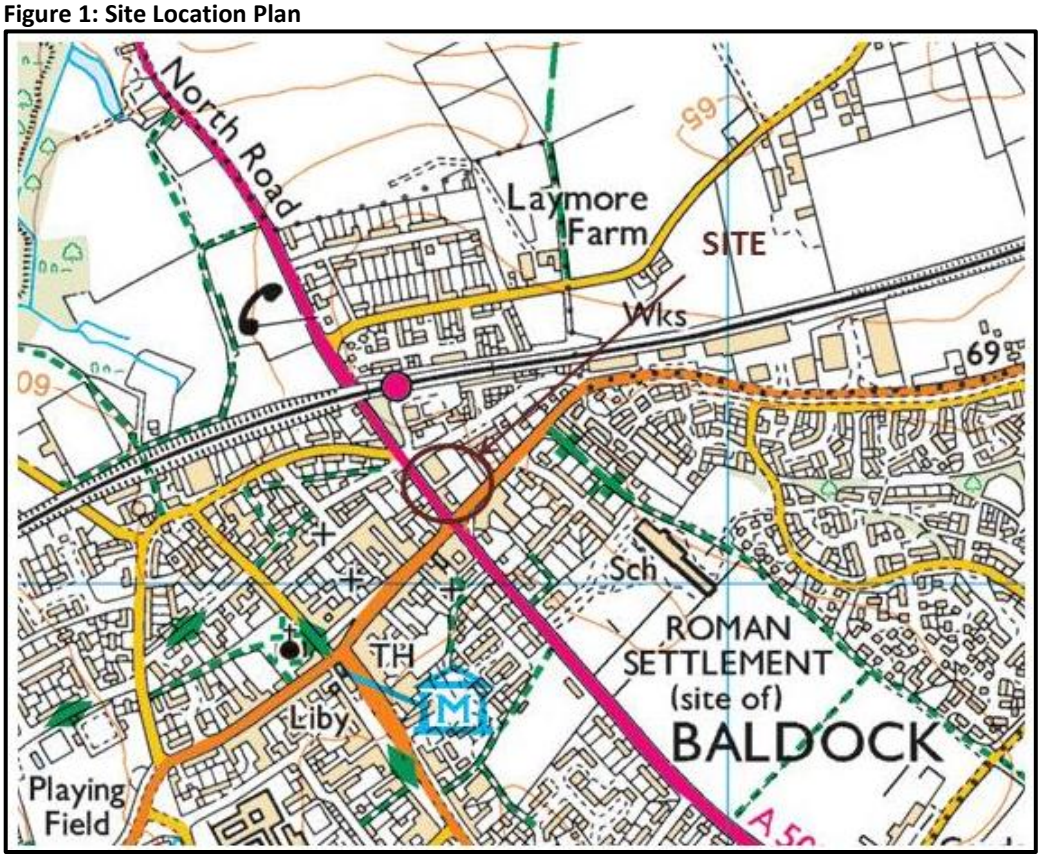
All validation work has been carried out in accordance with the Guidance document listed above and BS10175:2011 + A1:2013 (Code of Practice for the Investigation of Potentially Contaminated Sites) and BS5930:2015 (Code of Practice for Site Investigations).

2. SITE SETTING

2.1 Site Location

The site is located at the former Agricultural Works, Station Road, Baldock, SG7 5BS and is approximated by the National Grid Reference TL 346341. The site location is shown in Figure 1.

Figure 1: Site Location Plan



The site is located between Royston Road, Station Road and the Icknield Way East. The area where the site is located is generally residential, with Baldock Railway Station, located approximately 100m to the North.

2.2 Site Description

The site is roughly rectangular in shape and covers an area of approximately 0.5Ha. Prior to development, the site was divided into approximately two equal sized halves. The site is generally level at an approximate elevation of 61m AOD and comprised a rectangular building, used for the repair of motor vehicles, with associated car parking located in the Northern part, whilst the Southern part was used for used vehicle sales.

2.3 Geological Setting

Details of the geology underlying the site have been obtained from the British Geological Survey website www.bgs.ac.uk.

The records indicate the site to be underlain by superficial deposits of Head (comprising clay, silt, sand and gravel). The Head is underlain by the Holywell Nodular Chalk and New Pit Chalk Formation (undifferentiated).

The Environment Agency has classified the Head as unproductive strata while the underlying Holywell Nodular Chalk and New Pit Chalk Formation is classified as a Principal Aquifer. The site is shown to be within a Groundwater Source Protection Zone II.

The nearest surface water feature is the culverted River Ivel 79m to the Southwest.

3. SUMMARY OF PHASED INVESTIGATION

The following documents have previously been prepared for the site:

- Stansted Environmental Services Limited: CON01-BALD-029 – Former Agricultural Works, Station Road, Baldock Hertfordshire, SG7 5BS; Tier I Desktop Study Report dated 16th January 2015.
- Stansted Environmental Services Limited: CON01-BALD-029 – Former Agricultural Works, Station Road, Baldock Hertfordshire, SG7 5BS; Tier IIa Preliminary Soil Sampling Investigation dated 5th May 2015.
- Stansted Environmental Services Limited: Phase II Ground Investigation Report (Version 2) for Former Agricultural Works, Station Road, Baldock, SG7 5BS. Ref: CON01-BALD-029, dated 13th July 2017.

Historically the site was developed as an agricultural engineering works in the 1950s, changing use to a vehicle repair centre in the 1990s. The historical maps indicate that the site was located in a largely residential setting, with some enclaves of small scale industry, throughout the study period.

Due to the envisaged risk presented to sensitive human health and water resource receptors by the potential presence of contamination resulting from the sites former use as an agricultural engineering works and vehicle repair centre, intrusive sampling was recommended.

There appeared to be no olfactory or visual impact of contamination at the groundwater smear zone.

The Phase II Ground Investigation Report indicated that the soil sampling analysis results showed the presence of arsenic, lead and individual speciated PAHS associated with the Made Ground may impact on human health. It was judged that the risk to controlled water is very low as the site is underlain by at least 5m of putty chalk. This would inhibit the downward and lateral migration of contamination. In addition, removal of the near surface soils (and therefore contaminated soils), as part of the remediation strategy, would also limit the potential for contamination to migrate

It was concluded, therefore, that some limited remediation would be required in garden areas and soft landscaped areas of the proposed development, but this should be limited to a minimum thickness of clean cover.

4. PROPOSED REMEDIATION STRATEGY

A Remediation Method Statement has been produced by SES, as follow:

- Stansted Environmental Services Limited: Remediation Method Statement for Former Agricultural Works, Station Road, Baldock, SG7 5BS. Ref: CON01-BALD-029, dated 12th May 2017.

The RMS is summarised as follows:

- Within the private gardens and landscaped areas, topsoil will need to be imported. It is recommended that the Made Ground is excavated to a maximum depth up to 415mm in these areas and replaced with clean inert material. If Made Ground still exists at the base of the excavation then a capillary break should be incorporated at the base either comprising geotextile membrane or crushed concrete. The imported materials should comprise at least a 150mm thickness of good quality organic topsoil.
- Whilst a certificate confirming contaminant concentrations for all imported soil should be obtained from the supplier prior to importation, independent chemical analysis of the material will also need to be undertaken once it is in place to confirm its quality and suitability for use in garden areas. All contaminant concentrations must be below published screening criteria for a residential end use with homegrown produce and the thickness of the imported layer will also need to be measured and photographed for validation purposes.
- Should any previously unidentified contamination or deleterious materials be encountered during ground works, further assessment will need to be undertaken.
- All waste material must be disposed of to an appropriately licensed site. The chemical testing and assessments previously carried out may be used to aid classification of any soil that is to be disposed of. However, further testing might be required by the tip prior to disposal. Copies of the waste consignment documentation should be kept for validation purposes.
- A Validation Statement will need to be produced following completion of the remedial works, detailing the measures undertaken, including all relevant documentation, and confirming that the site is suitable for its proposed use.

5. VALIDATION

Excavation

Made Ground was excavated and removed from the site by B P Mitchell Haulage Contractors Limited from the areas denoted in the Remediation Method Statement. Copies of waste transfer notes can be supplied on request.

Sampling

Topsoil was supplied from a site at Tyttenhanger, St Albans. Chemical analysis test certificates for the material are attached within Appendix B.

SES attended the site on 19th July 2017 to validate the depth of cover by excavating hand dug pits within the landscaped areas. A validation sample location plan is attached within Appendix A as reference. Photographs of the excavations are provided within Appendix C.

Samples were taken of the placed topsoil and subsoil. The samples were forwarded to an UKAS/MCerts accredited laboratory on the day of collection in cool boxes and were scheduled for the following general suite of contaminants:

- A suite of metals comprising As, Cu, Cd, Cr, Cr VI, Hg, Pb, Ni, Se and Zn;
- Speciated Poly Aromatic Hydrocarbons (PAHs);
- Banded petroleum hydrocarbons (TPH CWG);
- Asbestos identification;
- Total monohydric phenols;
- Total cyanide;
- pH; and
- Total Organic Carbon (TOC).

The results of the analysis are attached in Appendix D.

Generic Human Health Risk Assessment

Attention is drawn to the fact that whilst every effort has been made to ensure the accuracy of the data supplied and any analysis derived from it, there are potential risks of variations in ground conditions and contamination between and beyond the specific locations investigated. No liability can be accepted for any such variations. Furthermore, any recommendations are specific to the client requirements and no liability will be accepted should these be used by third parties without prior consultation with SES.

In order to provide an initial indication of whether the tested soils could pose a risk to human health, SES subjected the aforementioned chemical data to a Generic Risk Assessment (GRA). The initial screen of the chemical data was made against available Suitable 4 Use Levels (S4ULs) and Category 4 Screening Levels (C4SLs) that reflect the most sensitive potential end use of 'residential with home grown produce' (RwHP). In this instance the most sensitive potential receptor is judged to be a female child between the age of 0 and 6 years. The consumption of contaminants via home grown fruit and vegetables has also been considered as an applicable pathway. Exceedances of assessment criteria may require further detailed/semi detailed quantitative risk assessment.

A comparison of the results recorded by the analysis with the corresponding generic screening criteria is presented in the following table for those samples which recorded positive results:

Table 1: Statistics

Contaminant	Key statistics				S4UL* (RwHP)	
	Number of detects	Min. Value (mg/kg)	Max. Value (mg/kg)	Mean Value (mg/kg)	S4UL (mg/kg)	No. Samples exceeding assessment criteria
Arsenic	8	7.4	17	14	37	0
Cadmium	8	0.2	0.4	0.27	11	0
Chromium III	8	12	31	18	910	0
Copper	8	17	63	29	2400	0
Lead#	8	20	110	54	200	0
Nickel	8	12	28	21	180	0
Zinc	8	95	170	122	3700	0
Phenanthrene	2	0.10	0.50	0.30	95	0
Anthracene	1		0.20		20	0
Fluoranthene	4	0.20	4.4	1.6	280	0
Pyrene	4	0.20	3.6	1.3	620	0
Benzo(a)anthracene	3	0.1	0.70	0.33	7.2	0
Chrysene	3	0.1	0.70	0.37	15	0
Benzo(b)fluoranthene	2	0.2	0.50	0.35	2.6	0
Benzo(k)fluoranthene	2	0.30	0.60	0.45	77	0
Benzo(a)pyrene	2	0.30	0.70	0.50	2.2	0
Indeno(123-cd)pyrene	1		0.30		27	0
Benzo(ghi)perylene	1		0.30		320	0
TPH (aliphatic $C_{10} - C_{12}$)	3	14	19	17	27	0
TPH (aliphatic $C_{12} - C_{16}$)	3	16	25	21	1100	0
TPH (aromatic $C_{12} - C_{16}$)	6	3	9	5.5	140	0
TPH (aliphatic $C_{16} - C_{21}$)	8	2	47	15	65000	0
TPH (aromatic $C_{16} - C_{21}$)	8	29	71	44	260	0
TPH (aliphatic $C_{21} - C_{35}$)	8	19	190	84	65000	0
TPH (aromatic $C_{21} - C_{35}$)	8	79	610	214	1100	0

Notes to Table

** Most appropriate screening values are Sustainable 4 Use Level (S4UL) for a residential with homegrown produce end use, a sandy loam soil type, pH of 7 and a soil organic matter (SOM) of 1%.*

 # Category 4 Screening Level (2014) use in absence of suitable S4UL.

Asbestos was not detected in any of the samples tested.

All of the tested determinands were less than their respective S4ULs and are, therefore, not considered to have the potential to pose a significant risk to human health.

6. SUMMARY & CONCLUSIONS

Based upon the observations made at the study site by SES, the results of the attached chemical analysis and a review of information supplied by the Client the following has been established:

- Supplied information and site reconnaissance by SES indicates that superficial Made Ground soils previously identified as being impacted by contamination were generally excavated from the garden areas of the development to the required maximum depth of up to 415mm;
- Photographic evidence indicates that a minimum of 300mm of topsoil has been placed;
- Laboratory analysis of the subsoil and topsoil imported to the site did not record elevated concentrations of any of the potential contaminants tested; and
- Based upon a review of supplied information, soil material excavated from the site was handled by a registered waste carrier, B P Mitchell Haulage Contractors Limited, and was disposed of to a permitted waste management facility.

Validation of the imported subsoil and topsoil was undertaken at the northern part of the study site known as Former Agricultural Works, Station Rad, Baldock in July 2017.

This Validation Report has been prepared by SES as supporting evidence for the partial discharge of Condition 16 of the Planning Consent 15/031357/1 granted 5th August 2016 for the northern part of the site (Phase 1).

7. APPENDICES

A – PLANS & FIGURES
B – TOPSOIL CONFORMITY TESTING
C – SITE PHOTOGRAPHS
D – RESULTS OF LABORATORY ANALYSES FOR VALIDATION SAMPLES

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A. PLANS & FIGURES

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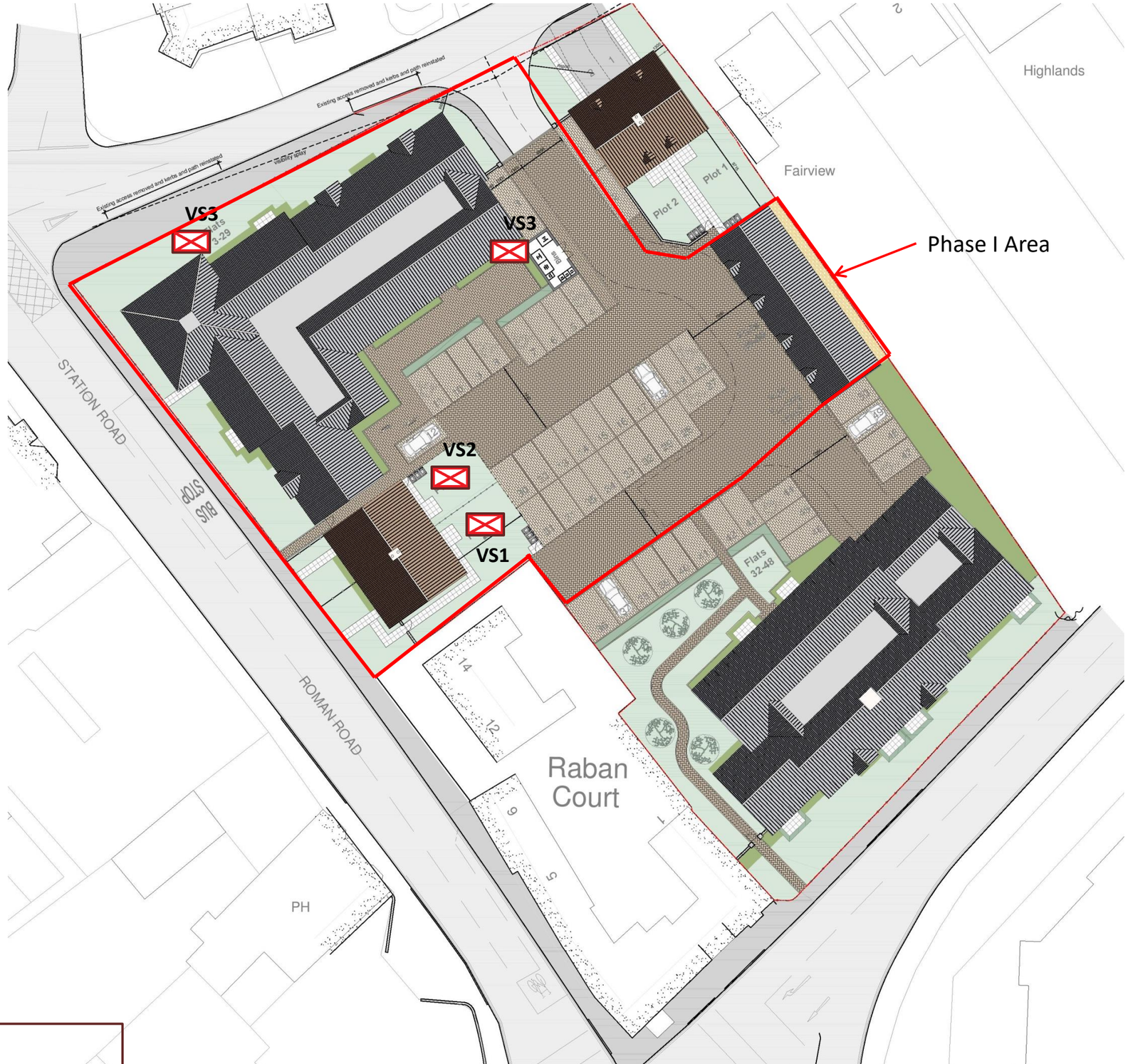

LEGEND

Validation Sample Location

Originator	GB	**STATION ROAD, BALDOCK** **CON01-BALD-029**
Checked & Approved	WGG	**VALIDATION SAMPLE LOCATION PLAN – PHASE I AREA**

STANSTED ENVIRONMENTAL SERVICES

07/07/2017

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B. TOPSOIL CERTIFICATE OF CONFORMITY

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SLC
Soil & Land Consultants

Freeland Horticulture Ltd
Rosedale Nursery
College Road
Hextable
Kent
BR8 7LT

Attention: Philippa Lambourne

Our Ref: SLC-12-AN-0563-SA

12 July 2017

Dear Philippa

Topsoil Analysis Report : Tyttenhanger, St Albans – July 2017

We have completed the analysis of the topsoil sample recently taken from the above site and have the pleasure of reporting our findings. The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes.

SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as a dark brown, friable *sandy loam* with a moderately developed, medium to coarse granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, etc) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- pH & electrical conductivity values;
- major plant nutrients (N, P, K, Mg) & organic matter content;
- particle size distribution and stone content;
- heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- sulphate, sulphur, sulphide;
- total cyanide and total (mono) phenols;
- speciated PAHs (US EPA16);
- banded aromatic and aliphatic petroleum hydrocarbons (C_5-C_{35}).

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in nature (pH 8.4) with a pH value that would be considered suitable for general landscaping purposes.

The electrical conductivity value using the soil:water extract was moderate (1195µS/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

Organic Matter & Nutrient Status

The sample contained adequate levels of organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

Particle Size Distribution & Stone Content

The sample contained 83% sand and fell into the *sandy loam* texture class. This particle size distribution is considered suitable for a broad range of landscape applications, including tree and shrub planting, turfing and seeding.

The sample was free from stones of 50 mm and upwards in diameter and only contained a slight fraction of smaller stones (24.8). As such, stones will not restrict the use of the soil for landscaping purposes.

Potential Contaminants

We are not aware of any specified contaminant levels set for the proposed end-use of this topsoil so the following comments are based on the Soil Guideline Values (SGVs) for residential end-use presented in the Contaminated Land Exposure Assessment (CLEA) Model (EA/DEFRA:2002). The SGVs currently only consider a limited range of parameters so where a potential contaminant is not covered by the CLEA Model other relevant schedules for contamination assessment, such as the Dutch Guidelines, and professional judgement have been used.

Of the potential contaminants determined, none was found at levels that would indicate significant contamination.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, sandy loam. The organic matter and nutrient levels are acceptable and no significant contamination was found with respect to the parameters determined. This soil would adhere to all aspects of the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you have any queries or comments.

Freeland 01922 619161

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	St Albans, Hertfordshire
Month/Year	July 17
Our Ref	SLC-17-AN-0563-SA
Date	12 July 2017

		Composite sample
pH Value & Salinity		
pH value (1:2.5 soil/water ext)	units	8.4
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm	1195
Organic Matter & Nutrient Status		
Organic Matter (LOI)	%	5.2
Organic Carbon (Derived)	%	3.0
Total Nitrogen	%	0.250
Carbon:Nitrogen Ratio	:1	12
Available Phosphorus	mg/l	69.4
Available Potassium	mg/l	1720
Available Magnesium	mg/l	129
Particle Size Analysis & Stones		
Clay (<0.002mm)	%	9
Silt (0.063-0.002mm)	%	8
Sand (2.0-0.063mm)	%	83
Texture Class	UK Class	Loamy Sand
Stones 2-20mm	% by DW	21.0
Stones 20-50mm	% by DW	3.8
Stones >50mm	% by DW	0.0
Potential Contaminants		
Total Arsenic (As)	mg/kg	14.1
Total Cadmium (Cd)	mg/kg	0.14
Total Chromium (Cr)	mg/kg	17.3
Hexavalent Chromium (CR^{VI})	mg/kg	<0.1
Total Copper (Cu)	mg/kg	19.2
Total Lead (Pb)	mg/kg	20.9
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	18.9
Total Selenium (Se)	mg/kg	0.18
Total Zinc (Zn)	mg/kg	86.5
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	40.0
Total Vanadium (V)	mg/kg	27.3
Hot Water Soluble Boron (B)	mg/kg	1.8
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	<5
Easily Liberated Sulphide (S^{2-})	mg/kg	<1
Water Soluble Sulphate (SO_4^{2-})	mg/l	83.4
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	St Albans, Hertfordshire
Month/Year	July 17
Our Ref	SLC-17-AN-0563-SA
Date	12 July 2017

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	<0.05
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C_5-C_6	mg/kg	<0.2
Aliphatic TPH >C_6-C_8	mg/kg	<0.4
Aliphatic TPH >C_8-C_{10}	mg/kg	<4
Aliphatic TPH >C_{10}-C_{12}	mg/kg	<4
Aliphatic TPH >C_{12}-C_{16}	mg/kg	<4
Aliphatic TPH >C_{16}-C_{21}	mg/kg	<4
Aliphatic TPH >C_{21}-C_{35}	mg/kg	15.3
Aliphatic TPH >C_{35}-C_{44}	mg/kg	<12

Aromatic TPH >C_5-C_7	mg/kg	<0.02
Aromatic TPH >C_7-C_8	mg/kg	<0.02
Aromatic TPH >C_8-C_{10}	mg/kg	<0.02
Aromatic TPH >C_{10}-C_{12}	mg/kg	<4
Aromatic TPH >C_{12}-C_{16}	mg/kg	<4
Aromatic TPH >C_{16}-C_{21}	mg/kg	<4
Aromatic TPH >C_{21}-C_{35}	mg/kg	22.5
Aromatic TPH >C_{35}-C_{44}	mg/kg	<0.2

Total Petroleum Hydrocarbons (C_5-C_{44})	mg/kg	37.8

BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p- Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

Chain of Custody requires a Freeland Horticulture Delivery Ticket-01322 619161

C. SITE PHOTOGRAPHS

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General View of Rear Gardens VS1 & VS2



VS1

Originator	GB	**STATION ROAD, BALDOCK** **CON01-BALD-029**	SES STANSTED ENVIRONMENTAL SERVICES
Checked & Approved	WGG	**SITE PHOTOGRAPHS**	

07/08/2017



VS2



VS3

Originator	GB	**STATION ROAD, BALDOCK** **CON01-BALD-029**	SES STANSTED ENVIRONMENTAL SERVICES
Checked & Approved	WGG	**SITE PHOTOGRAPHS**	

07/08/2017



VS4

Originator	GB	**STATION ROAD, BALDOCK** **CON01-BALD-029**	SES STANSTED ENVIRONMENTAL SERVICES
Checked & Approved	WGG	**SITE PHOTOGRAPHS**	

07/08/2017

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D. RESULTS OF LABORATORY ANALYSIS

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DELIVERING SCIENCE

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Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 671911-1

Date of Report: 03-Aug-2017

Customer: Stansted Environmental Services Ltd
The Stansted Centre
Parsonage Road
Takeley
Essex
CM22 6PU

Customer Contact: Mr Gavin Greenwood

Customer Job Reference: CON1-BALD-029
Customer Site Reference: WH169 - Baldock
Date Job Received at Concept: 28-Jul-2017
Date Analysis Started: 31-Jul-2017
Date Analysis Completed: 03-Aug-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept SOPs

All results have been reviewed in accordance with Section 25 of the Concept, Analytical Quality Quality Manual

UKAS TESTING
1549

Report checked and authorised by :
Aislinn Arthey
Trainee Project Manager

Issued by :
Aislinn Arthey
Trainee Project Manager

Concept Reference: 671911
Project Site: WH169 - Baldock
Customer Reference: CON1-BALD-029

Soil Analysed as Soil
SES Suite 1

				Concept Reference	**671911 001**	**671911 002**	**671911 003**	**671911 004**	**671911 005**
				Customer Sample Reference	**VS1_Topsoil @ 0.30m**	**VS1_Subsoil @ 0.45m**	**VS2_Topsoil @ 0.30m**	**VS2_Subsoil @ 0.45m**	**VS3_Topsoil @ 0.30m**
				Date Sampled	**28-JUL-2017**	**28-JUL-2017**	**28-JUL-2017**	**28-JUL-2017**	**28-JUL-2017**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T257	A40	2.0	mg/kg	**16**	**11**	**16**	**13**	**16**
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	**0.2**	**0.2**	**0.2**	**0.4**	**0.2**
Chromium	T245	A40	0.5	mg/kg	**17**	**14**	**16**	**18**	**19**
Copper	T245	A40	1.0	mg/kg	**20**	**24**	**19**	**63**	**17**
Lead	T257	A40	0.5	mg/kg	**26**	**67**	**23**	**83**	**20**
Mercury	T245	A40	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	**25**	**13**	**25**	**17**	**27**
Selenium	T257	A40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T257	A40	0.5	mg/kg	**97**	**100**	**95**	**160**	**97**
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1	<1	<1
Soil Organic Matter	T287	A40	0.1	%	**5.2**	**1.4**	**5.2**	**3.1**	**4.0**
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	**0.24**	**1.4**	**0.12**	**1.4**	**0.12**
pH	T7	A40			**7.9**	**9.9**	**7.9**	**8.5**	**8.0**
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1	<1	<1

Concept Reference: 671911
Project Site: WH169 - Baldock
Customer Reference: CON1-BALD-029

Soil Analysed as Soil
SES Suite 1

				Concept Reference	**671911 006**	**671911 007**	**671911 008**
				Customer Sample Reference	**VS3_Subsoil @ 0.45m**	**VS4_Topsoil @ 0.30m**	**VS4_Subsoil @ 0.45m**
				Date Sampled	**28-JUL-2017**	**28-JUL-2017**	**28-JUL-2017**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Arsenic	T257	A40	2.0	mg/kg	**13**	**17**	**8.4**
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	**0.3**	**0.2**	**0.4**
Chromium	T245	A40	0.5	mg/kg	**31**	**18**	**12**
Copper	T245	A40	1.0	mg/kg	**42**	**18**	**27**
Lead	T257	A40	0.5	mg/kg	**70**	**34**	**110**
Mercury	T245	A40	1.0	mg/kg	<1.0	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	**22**	**28**	**12**
Selenium	T257	A40	3	mg/kg	<3	<3	<3
Zinc	T257	A40	0.5	mg/kg	**170**	**96**	**160**
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1
Soil Organic Matter	T287	A40	0.1	%	**1.4**	**4.3**	**2.2**
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	**0.02**	**0.13**	**0.48**
pH	T7	A40			**12.2**	**8.3**	**9.5**
Cyanide(Total)	T546	AR	1	mg/kg	<1	<1	<1
Phenols(Mono)	T546	AR	1	mg/kg	<1	<1	<1

Concept Reference: 671911
Project Site: WH169 - Baldock
Customer Reference: CON1-BALD-029

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE)

				Concept Reference	**671911 001**	**671911 002**	**671911 003**	**671911 004**	**671911 005**
				Customer Sample Reference	**VS1_Topsoil @ 0.30m**	**VS1_Subsoil @ 0.45m**	**VS2_Topsoil @ 0.30m**	**VS2_Subsoil @ 0.45m**	**VS3_Topsoil @ 0.30m**
				Date Sampled	**28-JUL-2017**	**28-JUL-2017**	**28-JUL-2017**	**28-JUL-2017**	**28-JUL-2017**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	<0.1	<0.1	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	<0.1	<0.1	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	<0.1	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	<0.1	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	<0.1	**0.5**	**0.1**
Anthracene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	<0.1	**0.2**	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	**0.3**	**1.3**	**0.2**
Pyrene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	**0.3**	**1.1**	**0.2**
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	**0.2**	**0.7**	**0.1**
Chrysene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	**0.3**	**0.7**	**0.1**
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	**0.2**	**0.5**	<0.1
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	**0.3**	**0.6**	<0.1
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	**0.3**	**0.7**	<0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	<0.1	**0.3**	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	<0.1	**0.3**	<0.1
PAH(total)	T16	AR	0.1	mg/kg	<0.1	(2) <0.3	**1.8**	**6.7**	**0.7**

Concept Reference: 671911
Project Site: WH169 - Baldock
Customer Reference: CON1-BALD-029

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE)

				Concept Reference	**671911 006**	**671911 007**	**671911 008**
				Customer Sample Reference	**VS3_Subsoil @ 0.45m**	**VS4_Topsoil @ 0.30m**	**VS4_Subsoil @ 0.45m**
				Date Sampled	**28-JUL-2017**	**28-JUL-2017**	**28-JUL-2017**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Naphthalene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Acenaphthylene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Acenaphthene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Fluorene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Phenanthrene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Anthracene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Fluoranthene	T16	AR	0.1	mg/kg	**4.4**	<0.1	(2) <0.3
Pyrene	T16	AR	0.1	mg/kg	**3.6**	<0.1	(2) <0.3
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Chrysene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	(2) <0.3	<0.1	(2) <0.3
PAH(total)	T16	AR	0.1	mg/kg	**7.9**	<0.1	(2) <0.3

Concept Reference: 671911
Project Site: WH169 - Baldock
Customer Reference: CON1-BALD-029

Soil Analysed as Soil
TPH UKCWG

					Concept Reference	671911 001	671911 002	671911 003	671911 004	671911 005
					Customer Sample Reference	VS1_Topsoil @ 0.30m	VS1_Subsoil @ 0.45m	VS2_Topsoil @ 0.30m	VS2_Subsoil @ 0.45m	VS3_Topsoil @ 0.30m
					Date Sampled	28-JUL-2017	28-JUL-2017	28-JUL-2017	28-JUL-2017	28-JUL-2017
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Benzene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
Toluene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
EthylBenzene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
M/P Xylene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
O Xylene	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<1	<1	<1	<1	<1
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	<2	**19**	<2	<2	<2
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	<2	<2	<2	<2	<2
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	<2	**16**	<2	<2	<2
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	**5**	<2	**5**	**4**	**9**
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	**3**	**25**	**3**	**2**	**4**
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	**34**	**29**	**39**	**33**	**61**
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	**31**	**130**	**42**	**19**	**52**
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	**79**	**240**	**98**	**97**	**160**

Concept Reference: 671911
Project Site: WH169 - Baldock
Customer Reference: CON1-BALD-029

Soil Analysed as Soil
TPH UKCWG

					Concept Reference	671911 006	671911 007	671911 008
					Customer Sample Reference	VS3_Subsoil @ 0.45m	VS4_Topsoil @ 0.30m	VS4_Subsoil @ 0.45m
					Date Sampled	28-JUL-2017	28-JUL-2017	28-JUL-2017
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Benzene	T54	AR	1	µg/kg	<1	<1	<1
Toluene	T54	AR	1	µg/kg	<1	<1	<1
EthylBenzene	T54	AR	1	µg/kg	<1	<1	<1
M/P Xylene	T54	AR	1	µg/kg	<1	<1	<1
O Xylene	T54	AR	1	µg/kg	<1	<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	<1	<1	<1
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	<0.010	<0.010	<0.010
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	**14**	<2	**19**
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	<2	<2	<2
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	**25**	<2	**22**
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	**3**	**7**	<2
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	**47**	**3**	**30**
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	**45**	**41**	**71**
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	**170**	**38**	**190**
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	**330**	**96**	**610**

Index to symbols used in 671911-1

Value	Description
A40	Assisted dried < 40C
AR	As Received
2	LOD Raised Due to Matrix Interference
S	Analysis was subcontracted
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos subcontracted to REC Limited

Method Index

Value	Description
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T6	ICP/OES
T245	ICP/OES (Aqua Regia Extraction)
T7	Probe
T287	Calc TOC/0.58
T219	GC/FID (SE)
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T27	PLM
T54	GC/MS (Headspace)
T82	ICP/OES (Sim)
T16	GC/MS
T546	Colorimetry (CF)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Arsenic	T257	A40	2.0	mg/kg	U	001-008
Boron (water-soluble)	T82	A40	1	mg/kg	N	001-008
Cadmium	T257	A40	0.1	mg/kg	U	001-008
Chromium	T245	A40	0.5	mg/kg	U	001-008
Copper	T245	A40	1.0	mg/kg	U	001-008
Lead	T257	A40	0.5	mg/kg	U	001-008
Mercury	T245	A40	1.0	mg/kg	U	001-008
Nickel	T257	A40	0.5	mg/kg	U	001-008
Selenium	T257	A40	3	mg/kg	U	001-008
Zinc	T257	A40	0.5	mg/kg	U	001-008
Asbestos ID	T27	A40			SU	001-008
Chromium VI	T6	A40	1	mg/kg	N	001-008
Soil Organic Matter	T287	A40	0.1	%	N	001-008
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	U	001-008
pH	T7	A40			N	001-008
Cyanide(Total)	T546	AR	1	mg/kg	U	001-008
Phenols(Mono)	T546	AR	1	mg/kg	U	001-008
Benzene	T54	AR	1	µg/kg	U	001-008
Toluene	T54	AR	1	µg/kg	U	001-008
EthylBenzene	T54	AR	1	µg/kg	U	001-008
M/P Xylene	T54	AR	1	µg/kg	U	001-008
O Xylene	T54	AR	1	µg/kg	U	001-008
Methyl tert-Butyl Ether	T54	AR	1	µg/kg	U	001-008
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	001-008
TPH (C6-C7 aromatic)	T54	AR	0.010	mg/kg	N	001-008
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	001-008
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	001-008
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	001-008
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	001-008
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	001-008
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	001-008
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	001-008
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	001-008
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	001-008
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	N	001-008
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	N	001-008
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	N	001-008

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Naphthalene	T16	AR	0.1	mg/kg	U	001-008
Acenaphthylene	T16	AR	0.1	mg/kg	U	001-008
Acenaphthene	T16	AR	0.1	mg/kg	U	001-008
Fluorene	T16	AR	0.1	mg/kg	U	001-008
Phenanthrene	T16	AR	0.1	mg/kg	U	001-008
Anthracene	T16	AR	0.1	mg/kg	U	001-008
Fluoranthene	T16	AR	0.1	mg/kg	N	001-008
Pyrene	T16	AR	0.1	mg/kg	N	001-008
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	U	001-008
Chrysene	T16	AR	0.1	mg/kg	U	001-008
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	001-008
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	001-008
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	U	001-008
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	U	001-008
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	U	001-008
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	U	001-008
PAH(total)	T16	AR	0.1	mg/kg	U	001-008