Ben Codling
Berkeley Homes (Eastern Counties) Ltd
Berkeley House
Oakhill Road
Sevenoaks, Kent
TN13 1NQ
[redacted]

31st January 2024

Our ref. LP1234\IVR\P174-175

Dear Ben,

Re: Hawkenbury – Interim Verification Report for Plots 174-175

1 Introduction

Leap Environmental Ltd (herein referred to as LEAP) have been commissioned by Berkeley Homes (Eastern Counties) Ltd (BHEC) to provide verification of placed clean cover in private gardens and areas of public open space at Hawkenbury Farm, Hawkenbury, Tunbridge Wells in Kent.

The instruction to proceed with provision of verification engineer services for the development was received in an email from Matthew Witney of Berkeley Homes (Eastern Counties) Ltd dated 1st December 2017.

Plans showing the location of the site and the proposed development layout are provided as Figures 1 and 2 respectively and included as Appendix B.

The scope of the remediation works required to be implemented by BHEC on site have been agreed with local regulators and the Environment Agency and were set out in the approved Remediation Implementation Plan, as prepared by Cognition Land and Water (Ref. CLW002346 V3, dated 13th December 2017) to which the reader is referred. The agreed works to be completed include:

- Removal of identified petroleum hydrocarbon hotspots;
- Installation of a clay cut-off wall with treatment gates;
- Processing of excavated landfill wastes for reuse within earthworks construction, allowing space for provision of clean cover systems by groundworkers;

- Monitoring of ground gases using continuous gas monitors and fortnightly spot monitoring (hand held monitors); and
- Monitoring of groundwater and surface waters.

This letter report provides an interim statement on verification inspections for Plots 174-175 located *outside of the former landfill area* of the site and presents a factual account of the findings of verification inspections carried out by LEAP on 13th December 2023.

Plans showing the site location, development layout and verification locations as well as selected photographs from the verification visits are attached to this letter.

2 Previous Studies

The site has been subject of a number of investigations by LEAP and others. The reader is referred to the following reports:

- LEAP Interim DQRA (report reference LP1234 dated 30th November 2016)
- LEAP Updated DQRA (report reference LP1234 dated 20th March 2017)
- LEAP Addendum Report (report reference LP1234 dated 30th June 2017)
- LEAP Preliminary Remediation Options Statement (report reference LP1234 dated 9th December 2016)
- Cognition Land and Water Remediation Implementation Plan (Ref. CLW002346 V3, dated 13th December 2017)
- Cognition Land and Water PRB Summary Design Report (Ref. CLW002346, dated 13th December 2017)
- Cognition Land and Water Validation Report for Hotspot Removal (Ref. CLW002346, dated 7th March 2018)

The completed studies identified that the site was formed of three land uses, being allotments (in the northernmost part of the site), a former claypit / brickworks backfilled with 1950's wastes across the central part of the site, with the southern portion of the site never subject to development and has remained as a paddock / grazing.

3 Recorded Contamination

Intrusive investigation works *within the former landfill area* recorded elevated concentrations of metals (including lead, copper and zinc) and polyaromatic hydrocarbons within the landfill wastes, above the published C4SL values for a residential with home grown produce land use. Additionally, the landfill material included abundant deleterious materials (brick, glass, ceramic and metal). Whilst widespread occurrences of asbestos were not encountered, localised caches were identified within the wastes as fragments of cement bonded sheeting with free fibres not being detected as being present.

4 Remediation

To protect future site users from the recorded contamination a remediation strategy was developed. The approved remediation strategy was presented with a Remediation Implementation Plan (RIP) as prepared by Cognition Land and Water (Ref. CLW002346 V3, dated 13th December 2017).

The remediation requirement for plots *outside of the former landfill area* included strip formation inspections (to confirm no deleterious material or elevated concentrations of contaminants of concern) followed by the placement of 150mm topsoil as a 'growing medium' within rear garden areas.

Gas protection measures for Amber 2 classification were identified as required for the development. The placement and verification of these gas protection measures is outside of the instructed scope of works for LEAP. It is understood that this element has been undertaken by others.

5 Topsoil

Topsoil from the former paddocks (greenfield area of the site) development site was stripped and stockpiled in the southern part of the site. LEAP undertook a stockpile assessment for BHEC including inspection/sampling and testing of topsoil stockpiles, denoted Spoil Heap 1 to 5 and 7A, 7B and 7C. The results of the analysis confirmed that the topsoil originating from the southern part of the site met both the chemical and physical requirements of the LEAP Topsoil Specification included within the Remediation Implementation Plan (CLW 2017).

Assessment of the topsoil in accordance with British Standard Specification for Topsoil[1] identified that some nutrient enhancement was required for Spoil Heaps 1, 2, 3, 4, 7A and 7B, with further enhancement of Spoil Heap 4 to improve the 'textural' classification of the soil.

LEAP understands the topsoil used within the rear gardens of plots 174-175 has been purchased and imported from Bat & Ball, Sevenoaks. Previous BS3882 Topsoil Quality testing by Freeland Horticulture Limited on 21st February 2023 on the material, confirmed that the topsoil is suitable for use as multipurpose topsoil and that it generally falls under the textrual classification of sandy loam.

[1] British Standards BS 3882:2015 Specification for topsoil

6 Verification

Verification inspections and sampling have been completed by LEAP engineers of the private gardens *outside* of the former landfill area of Plots 174-175. It has been confirmed by the client in an email dated 29th January 2024 that the cover soils used within the gardens have been imported from Bat & Ball, Sevenoaks. Phase 2 is located to the south of the landfilled area of the site and is not impacted by contamination with no remediation requirements.

The completed inspection visits are summarised as follows.

Visit 13th December 2023

LEAP attended site to inspect the subsoil within Plots 174-175. Hand augers were undertaken in Plots 174 and 175.

Ground conditions generally comprised orange brown very gravelly sandy clay. With gravel of flint, sandstone, and rare wood proven to 450mm.

Samples of the subsoil were collected and tested for contaminants of concern including heavy metals, polyaromatic hydrocarbons and asbestos (referenced Plot 174 at 0.40m and Plot 175 at 0.30m –subsoil).

Results of chemical analysis testing of the subsoil samples from Plot 174 at 0.40m and Plot 175 at 0.30m did not record any unacceptable concentrations of contaminants (all below the screening criteria for a residential end use).

The hand auger locations are shown in Figure 3, Appendix B, together with selected photographs (Appendix D). The chemical analysis results are included in Appendix C.

Client Photographs

At the time of the visit, topsoil within the plots had not been placed. Given that there was sufficient depth for topsoil to be placed, it was agreed that the provision of photographs showing the topsoil, including the thickness, across the gardens would be acceptable. Photographs have been provided by the client in an email dated 29th January 2024. The photos show the gardens are free of deleterious material and that 150mm of topsoil has been placed, see inspection photographs in Appendix D.

7 Conclusions

Inspection of private gardens, and information provided by the Client, has demonstrated that a minimum of 150mm verified clean topsoil has been placed in the rear garden areas of Plots 174-175.

Validation inspections of gas protection measures is outside of the instructed scope of works for LEAP.

Yours sincerely,

Georgia Malin BSc FGS

Enc.

Appendix A – Limitations

Appendix B – Figures

Appendix C – Chemical Test Results

Appendix D – Inspection Photographs

Limitations

LIMITATIONS

This report is confidential to the Client and RSK Environment Ltd trading as Leap Environmental and Leap Environmental accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental beforehand. Any such party relies upon the report at their own risk. Unless explicitly agreed otherwise in writing, this report has been prepared under LEAP's standard terms and conditions, as included in the quotation for this works.

This report has been prepared by Leap Environmental on the basis of information received from a variety of sources which Leap Environmental believes to be accurate. Nevertheless, Leap Environmental cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

Leap Environmental has used all reasonable skill, care and diligence in the design and execution of this report, taking into account the manpower and resources devoted to it in agreement with the Client. Although every reasonable effort has been made to obtain all relevant information, all potential contamination, environmental constraints or liabilities associated with the site may not necessarily have been revealed. LEAP cannot be held responsible for any disclosures or changes in regulation that are provided post production of this report, and will not automatically update the report.

The conclusions reached in this report are necessarily restricted to those which can be determined from the information consulted, and may be subject to amendment in the light of additional information becoming available. These conclusions may not be appropriate for alternative schemes.

The extent of the exploratory holes, laboratory testing and monitoring undertaken may have been restricted due to a number of factors including accessibility, the presence of buried or overhead services, current development and site usage, timescales or client's specification. The exploratory holes only assess a small proportion of the site area with respect to the site as a whole, and as such may only provide an overall assessment of ground conditions on site. The presence of hotspots of undisclosed contamination or exceptional and unforeseen ground conditions cannot be discounted.

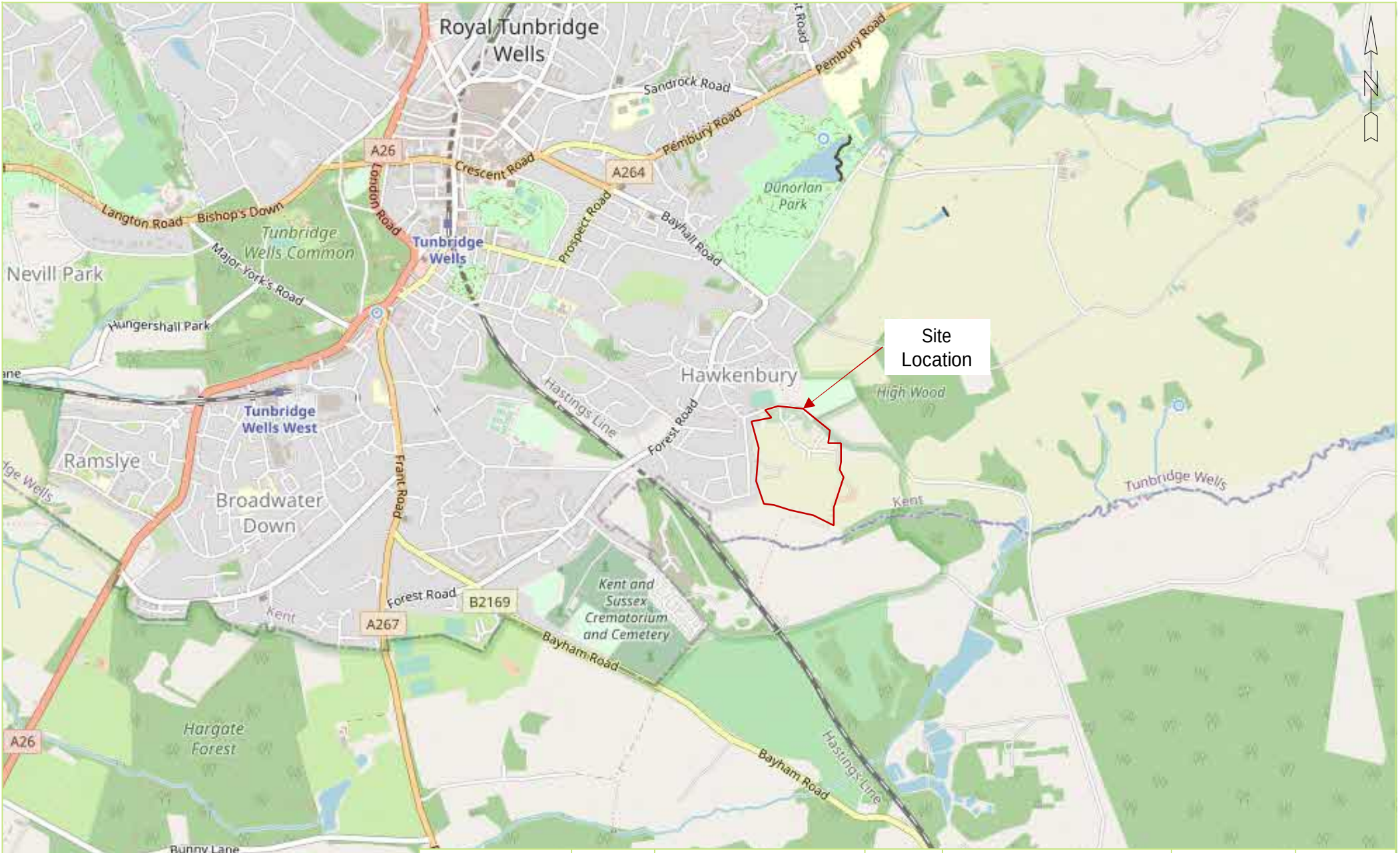
Eurocode 7 gives guidance on the type of sampling, sample quality, number and spacing of intrusive investigations, and number of laboratory tests required. It is intended that the Geotechnical Information section of this report will fulfil the general requirements of the Ground Investigation Report as set out in section 6 of Eurocode7[18], although this is subject to the restrictions imposed on the investigation as listed above. For geotechnical design,

[18] BS EN 1997 Eurocode 7- Geotechnical Design - Part 1: General Rules (2004) and Part 2: Ground Investigation and Testing (2007)

Eurocode 7 requires the Geotechnical Design Report to address both the geotechnical and structural aspects of the geotechnical design for both the limit and serviceability states. The Geotechnical Appraisal section of this report will not meet the requirements of a Geotechnical Design Report (GDR) and should therefore be used for preliminary guidance only.

The presence of asbestos may be noted during the site walkover survey, intrusive investigations and/or from the results of contamination testing. However, this report does not constitute an asbestos survey. On this basis, the presence of asbestos on site cannot be discounted and a full asbestos survey should be undertaken.

Figures



Basemap: © OpenStreetMap contributors
Note: Elevations not shown

Client:	Berkeley Homes Eastern Counties	Date:	27/01/2021	Project ID:	LP1234
Project:	Hawkenbury, Tunbridge Wells	Title:	Site Location Plan	Fig. No.	1

Basemap: © ECE Phase 2 Hawkenbury Layout
Note 1: Exploratory holes have been positioned by local measurements made by site engineer/handheld GPS survey/3rd party surveyors and should therefore only be taken as approximate
Note 2: Exploratory holes shown are not to scale
Note 3: Elevations not shown

leap environmental	Client:	Berkeley Homes Eastern Counties	Date:	18/01/2022	Project ID:	LP1234
	Project:	Hawkenbury, Tunbridge Wells	Title:	Proposed development plan	Fig. No.	2

Drawn: jbro	Checked: cb	Date: 01.12.17					
Job No: 6432	Drawing No: ECE 00 DR 90 001	Rev: P7					
Status: PRELIMINARY							

ECE Architecture

Basemap: © ECE Phase 1 Hawkenbury Layout
Note 1: Exploratory holes have been positioned by local measurements made by site engineer/handheld GPS survey/3rd party surveyors and should therefore only be taken as approximate
Note 2: Exploratory holes shown are not to scale
Note 3: Elevations not shown

leap environmental	Client:	Berkeley Homes Eastern Counties	Date:	27/03/2023	Project ID:	LP1234
	Project:	Hawkenbury, Tunbridge Wells	Title:	Inspection locations	Fig. No.	3

Chemical Test Results

Georgia Malin
Leap Environmental Ltd
South Coast Regional Office
Burgess Hill
RH15 9LR

Derwentside Environmental Testing Services Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 23-15350

Site Reference:	Hawkenbury
Project / Job Ref:	LP1234
Order No:	None Supplied
Sample Receipt Date:	15/12/2023
Sample Scheduled Date:	15/12/2023
Report Issue Number:	1
Reporting Date:	21/12/2023

Authorised by:

[redacted]
Steve Knight
Customer Support Manager

Dates of laboratory activities for each tested analyte are available upon request.

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

Soil Analysis Certificate						
DETS Report No: 23-15350	Date Sampled	13/12/23	13/12/23			
Leap Environmental Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Hawkenbury	TP / BH No	Plot 175	Plot 174			
Project / Job Ref: LP1234	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.30	0.40			
Reporting Date: 21/12/2023	DETS Sample No	690804	690805			

Determinand	Unit	RL	Accreditation					
Asbestos Screen (S)	N/a	N/a	ISO17025	Not Detected	Not Detected			
pH	pH Units	N/a	MCERTS	8.5	7.6			
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	0.9	1.8			
Arsenic (As)	mg/kg	< 2	MCERTS	7	7			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2			
Chromium (Cr)	mg/kg	< 2	MCERTS	12	13			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	16	19			
Lead (Pb)	mg/kg	< 3	MCERTS	19	25			
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	7	7			
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2			
Zinc (Zn)	mg/kg	< 3	MCERTS	39	41			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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

Soil Analysis Certificate - Speciated PAHs							
DETS Report No: 23-15350	Date Sampled	13/12/23	13/12/23			
Leap Environmental Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: Hawkenbury	TP / BH No	Plot 175	Plot 174			
Project / Job Ref: LP1234	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.30	0.40			
Reporting Date: 21/12/2023	DETS Sample No	690804	690805			

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	0.14	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	0.32	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	0.32	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.13	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	0.17	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.20	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.18	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6			

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

Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-15350	
Leap Environmental Ltd	
Site Reference: Hawkenbury	
Project / Job Ref: LP1234	
Order No: None Supplied	
Reporting Date: 21/12/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
690804	Plot 175	None Supplied	0.30	15.6	Brown sandy clay with stones
690805	Plot 174	None Supplied	0.40	16.9	Brown sandy clay with stones and vegetation

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

Insufficient Sample I/S

Unsuitable Sample U/S

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

Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 23-15350
Leap Environmental Ltd
Site Reference: Hawkenbury
Project / Job Ref: LP1234
Order No: None Supplied
Reporting Date: 21/12/2023

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	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
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

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

Attention: Philippa Lambourne

Our Ref: SLC-1132-SA

21 February 2023

Dear Philippa

Topsoil Analysis Report: Bat & Ball, Sevenoaks Topsoil – February 2023

We have completed the analysis of the topsoil sample recently taken from the above site and it has been forwarded to an approved laboratory for analysis 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 and its compliance with the current British Standard for topsoil (BS3882).

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 dark brown, slightly moist and friable with a well-developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS and MCERTS 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}).
- Asbestos

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 (salinity) value using the soil:water extract was 844µS/cm indicating that soluble salts are not present at levels that would be harmful to plants.

The electrical conductivity values by $CaSO_4$ extract (BS3882 requirement) fell below the maximum specified value (3300µS/cm) given in BS3882:2015.

Organic Matter & Nutrient Status

The sample was rich in 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.

The C:N ratio of the sample was acceptable for general landscape purposes

Particle Size Distribution & Stone Content

The sample contained 69% 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 Virtually free from stones of 50 mm and upwards in diameter and only contained a slight fraction of smaller stones (0.3%). 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. This includes human health, environmental protection and metals considered toxic to plants. In the absence of any site-specific assessment criteria, the concentrations that affect human health have been compare with the 'residential with homegrown produce' land use in the Suitable For Use Levels presented in. 'The LQM/CIEH S4Uls' for Human Health Risk Assessmet (2015) and DEFRA SP1010: 'Development of Category 4 Screening Levels' for Assessment of Land Affected by Contamination – Policy Companion Document (2014).

Of the potential contaminants determined, none was found at levels that would exceed their respective guideline values.

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 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.

George Longmuir MSc Soil Sci. M.I Soil Sci.

Freeland
HORTICULTURE LIMITED

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Bat & Ball, Sevenoaks
Month/Year	February 23
Our Ref	1132-SA
Date	21 February 2023

		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	844
Electrical Conductivity (1:2.5 soil/CaSO4 ext)	µS/cm	2663
Neutralising Value ($CaCO_3$ equivalent)	%	2.4
Organic Matter & Nutrient Status		
Organic Matter (LOI)	%	5.9
Organic Carbon (Derived)	%	3.4
Total Nitrogen	%	0.216
Carbon:Nitrogen Ratio	:1	15.9
Available Phosphorus	mg/l	30.4
Available Potassium	mg/l	879
Available Magnesium	mg/l	252
Particle Size Analysis & Stones		
Clay (<0.002mm)	%	14
Silt (0.063-0.002mm)	%	17
Sand (2.0-0.063mm)	%	69
Texture Class	UK Class	SandyLoam
Stones 2-20mm	% by DW	0.3
Stones 20-50mm	% by DW	0.0
Stones >50mm	% by DW	0.0
Potential Contaminants		
Total Arsenic (As)	mg/kg	24.7
Total Cadmium (Cd)	mg/kg	<0.1
Total Chromium (Cr)	mg/kg	106
Hexavalent Chromium (CR^{VI})	mg/kg	0.3
Total Copper (Cu)	mg/kg	16.4
Total Lead (Pb)	mg/kg	21.9
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	44.0
Total Selenium (Se)	mg/kg	0.22
Total Zinc (Zn)	mg/kg	80.8
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	29.2
Total Vanadium (V)	mg/kg	112
Hot Water Soluble Boron (B)	mg/kg	1.3
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	28.3
Easily Liberated Sulphide (S^{2-})	mg/kg	<1
Water Soluble Sulphate (SO_4^{2-})	mg/l	197
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Freeland
HORTICULTURE LIMITED

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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	<0.05
Aliphatic TPH >C_6-C_8	mg/kg	<0.05
Aliphatic TPH >C_8-C_{10}	mg/kg	<0.05
Aliphatic TPH >C_{10}-C_{12}	mg/kg	<10
Aliphatic TPH >C_{12}-C_{16}	mg/kg	<10
Aliphatic TPH >C_{16}-C_{21}	mg/kg	<10
Aliphatic TPH >C_{21}-C_{35}	mg/kg	<10
Aliphatic TPH >C_{35}-C_{44}	mg/kg	<12

Aromatic TPH >C_5-C_7	mg/kg	<0.05
Aromatic TPH >C_7-C_8	mg/kg	<0.05
Aromatic TPH >C_8-C_{10}	mg/kg	<0.05
Aromatic TPH >C_{10}-C_{12}	mg/kg	<10
Aromatic TPH >C_{12}-C_{16}	mg/kg	<10
Aromatic TPH >C_{16}-C_{21}	mg/kg	<10
Aromatic TPH >C_{21}-C_{35}	mg/kg	35.0
Aromatic TPH >C_{35}-C_{44}	mg/kg	34.0

Total Petroleum Hydrocarbons (C_5-C_{44})	mg/kg	69.0

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

APPENDIX D – INSEPCTION PHOTOGRAPHS

Inspection Photographs

Plate 1 – Subsoil in rear garden of Plot 174 looking to 175, taken 13/12/2023.

Plate 2 – Subsoil in rear garden of Plot 175, taken 13/12/2023.

Plate 3 – Example of 350mm diggable soils in rear garden of Plot 174 with space for 150mm topsoil on top, taken 13/12/2023.

Plate 4 – Example of topsoil being placed in plot 175, marks on fence posts indicate 150mm topsoil has been placed, taken by the client 16/01/2024.

Plate 5 – Rear garden of plot 175 with topsoil placed. Taken by the client 16/01/2024.

Plate 6 – Example of topsoil being placed in plot 174, marks on fence posts indicate 150mm topsoil has been placed, taken by the client 16/01/2024.