
Remediation Verification Report

At: Antrim Grove
Allotments, Antrim Grove,
Belsize Park, London, NW3
4XR

For: London Borough of
Camden

Report Reference: LP2248/Verification

Report Date: 08 July 2022

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EXECUTIVE SUMMARY

Leap Environmental Ltd (**LEAP**) was appointed by the London Borough of Camden to undertake remediation verification works at a site referred to as Antrim Grove Allotments, Antrim Grove, Belsize Park, London, NW3 4XR.



The site has a history of use as a nursery prior to becoming allotment gardens between c. 1920 and 1950. The site will remain as allotment gardens post remediation. The site has been subject to a single phase of intrusive investigation by Leap Environmental Ltd.

Lead was concluded to be present site-wide at levels presenting a risk to current site users. Arsenic, zinc and benzo[a]pyrene in addition to lead were found to selectively fail the statistical assessments on a plot-by-plot basis.

Remediation measures comprised the application of clean cover soils across the full area of all 20 no. plots which will be enclosed within gabion walls. A deter to dig membrane and 500mm of clean cover was required.

This report presents a detailed summary of the remediation and verification works carried out the site.

It is considered that this report demonstrates that the remediation has been undertaken in accordance with the RMS and that no unacceptable risks remain to the identified receptors.

Signed:	 Harry Punter BSc MSc MCSM
Countersigned:	 Tim Thorpe MSci ARSM FGS
Date:	8 July 2022
Revision:	Issue 2 - FINAL

A INTRODUCTION

I Authority

Leap Environmental Ltd (hereafter referred to as **LEAP**) was appointed by the London Borough of Camden (LB Camden) to provide independent verification of the remediation undertaken at Antrim Grove Allotments, Antrim Grove, Belsize Park, London, NW3 4XR.

This document sets out the remediation completed onsite between December 2021 and March 2022 and presents the verification data in accordance with the Remediation Method Statement (RMS):

- Remediation Method Statement. **LEAP** Environmental Ltd. Ref: LP2248/RMS Issue 1, dated 11th November 2021.

2 Objective

The objective of this report is to summarise the actions taken to complete the required remediation works at the site. This report outlines the background and overall requirement for remediation in addition to the methodologies employed on site, the results and conclusions. The report serves to enable the discharge of Condition 3 of LB Camden planning permission ref: 2021/4075/P.

3 Background

Leap Environmental Ltd (hereafter referred to as **LEAP**) was appointed by London Borough of Camden (LBC) to produce a Remediation Method Statement (RMS) for a site referred to as Antrim Grove Allotments, Antrim Grove, Belsize Park, London, NW3 4XR.

Ongoing work at one of the council's other allotment sites has identified some elevated concentrations of lead and benzo[a]pyrene along with the presence of asbestos. This, coupled with evidence of elevated concentrations of heavy metals at the subject site (gleaned from a borough-wide survey undertaken by the council themselves in the early 2000s) led the council to decide to investigate two of their other allotment sites, one being Antrim Grove.

LEAP undertook a Phase 1 Desk Study and Phase 2 intrusive investigation of the site in June 2020. Significantly elevated levels of lead were identified along with some elevated levels of other heavy metals and polycyclic aromatic hydrocarbons (PAHs). The decision was taken not to designate the land as contaminated as defined by Part 2A of the Environmental Protection Act (1990). Instead, the council decided to undertake voluntary remediation. A Remediation Options Appraisal was produced in November 2020 and a Remediation Method Statement was produced in November 2021.

3.1 Previous Reports

- Phase I Desk Study, Site Reconnaissance & Phase II Site Investigation Report: Antrim Grove Allotments, Antrim Grove Belsize Park, London, NW3 4XR. LEAP Environmental Ltd. Report Reference: LP2248, dated 28th July 2020; and
- Remediation Options Appraisal. LEAP Environmental Ltd. Ref: LP2248/ROA/Final, dated 3rd November 2020.

4 Proposed Land Use

The site will continue to be used as allotment gardens.

5 Environmental Setting and Site History

This Section provides a brief introduction to the site. Further information is provided within the RMS and the other reports referenced in Section 3.1 of this report.

5.1 Site Location and Description

The allotment site is located on Antrim Grove, Belsize Park, London, NW3 4XR. The site comprised c. 2,700m² of allotment gardens.

The site comprised 20 No. fairly regular, rectangular plots, 2 of which were full-sized and 18 of which were subdivided into half-sized plots. The site takes the appearance of a traditional walled garden and is largely flat apart from a c. 0.6m high retaining wall at the rear of the site where plots 1-6 are located. There was a communal seating area and tool shed in the central region of the site.

The site is bounded by housing to the east, southwest and northwest, by a playground to the southeast, by flats to the northeast and (according to online mapping) by a car rental company building to the north.

The allotments are located in a residential area and form 1 of 4 allotment sites in the LB of Camden which are run by allotment associations with the support of the council's parks team

5.2 Site History

The site has a history of use as a nursery prior to becoming allotment gardens between c. 1920 and 1950.

5.3 Contamination

Lead was concluded to be present site-wide in shallow soils at levels presenting a risk to current site users. Arsenic, zinc and benzo[a]pyrene in addition to lead were found to

selectively fail the statistical assessments on a plot-by-plot basis. No risks were identified to controlled waters, ecological receptors or buildings / structures.

6 Limitations

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

Leap Environmental Ltd 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.

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.

This report is confidential to the Client and Leap Environmental Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental Ltd beforehand. Any such party relies upon the report at their own risk. Full details of the limitations are provided in Appendix A.

B REMEDIATION PHASE

This section should be read in conjunction with the Remediation Strategy referenced in Section I. The remediation strategy was designed to mitigate the risks to human health (end users) that had been identified by the risk assessment. This would be achieved by breaking the source-pathway-receptor linkage, by removing the pathway by creating a physical barrier in the form of a clean cover system.

7 Remediation Strategy

The following remediation and verification measures were required at the site and agreed with the council:

- Application of a 500mm deep gabion-bordered clean cover system in all gardened areas of the site; and
- Independent verification of remediation measures namely:
 - Review of laboratory test data or sampling and testing of topsoil and subsoil proposed for import to site to act as clean cover;
 - Sampling and testing of clean cover soils post import;
 - Confirmation of the application of a deter-to-dig geotextile; and
 - Confirmation of the applied clean cover thickness.

8 Site Works

LB Camden engaged Ginkgo Gardens Ltd. (a specialist landscaping organisation) to undertake the remedial work. Work commenced in December 2021 with site clearance. The construction of the raised beds and Gabions commenced in January 2022 and was completed in March 2022. A total of 760T of subsoil and 1,140T of topsoil was imported from Bourne Amenity between 14th February and 1st April 2022. The subsoil comprised an 'as dug' product and the topsoil comprised a manufactured product.

9 Verification Works

9.1 Review of pre-import lab data

Ginkgo provided the following reports on 7th December 2021:

- Subsoil analysis report: Westerham Subsoil. Produced by: Tim O'Hare Associates Ref: TOHA/21/7189/2/SS, dated 18th October 2021;
- Topsoil analysis report: Westerham TS6 Topsoil. Produced by: Tim O'Hare Associates Ref: TOHA/21/7189/2/SS, dated 18th October 2021.

Both reports provided a visual assessment, chemical analysis and assessment against the criteria presented in the relevant British Standard (BS8601:2013 for subsoil and BS3882:2015 for topsoil) for a single sample.

Tim O'Hare Associates (a specialist soil and landscape consultancy) concluded both materials to be suitable for use as general landscaping materials (the subsoil was outside of the specified particle size distribution range but this was concluded to be insignificant by the authors). The topsoil was fully compliant with BS:3882:2105.

LEAP reviewed the chemical analysis and concluded no exceedances of the assessment criteria presented in the RMS. Queries were raised regarding:

- the alkaline nature of the materials (particularly the topsoil);
- the fact that the assessment by the specialist had been made for general landscaping purposes (as opposed to allotments); and
- the high sand content of the subsoil.

Ginko forwarded the queries to Tim O'Hare Associates. A response was received by LEAP (via the client) on 20th January 2022. The email indicated that the elevated pH was as a result of potassium in the compost element of the topsoil. Potassium is highly leachable and hence the pH was anticipated to reduce in time (as the soils are wetted). The response raised no concerns re the sandy nature of the subsoil or the intended use of the soils in an allotment setting.

9.2 Site visits – clean cover geo-chemical testing and thickness

1) 15th February 2020

At the time of the visit the site had been cleared and 500mm high Gabions had been constructed around the majority of the perimeter area of the site. A 1,000mm high Gabion wall had been constructed in place of the former retaining wall towards the rear of the site. The deter to dig membrane had been placed in the south eastern regions of the site. The membrane comprised Polyfelt produced by Tencate (a non-woven geotextile coloured yellow - similar to Terram). Subsoil had been applied to a depth of c. 250mm but had not yet been gently compacted. No topsoil was present on site. Four samples of subsoil were collected (two from insitu locations in the southeast of the site (confirming the thickness as c. 250mm) and two from material stockpiled on Polyfelt in the east of the site). Photographs are included as Appendix C.

The area to be filled was 1,900m² across the site. Ginko calculated a requirement for c. 760 tonnes of subsoil and c. 1140 tonnes of topsoil. The RMS stipulated a subsoil testing frequency of one sample per 150m³ with a minimum of three samples per source. Conservatively assuming that the materials have a density of 1 tonne per m³ (the materials are in fact likely to be denser) then testing of 6 No. subsoil samples should be required provided that all remaining material is imported from the same supplier (Bourne Amenity) and from the same batch.

The RMS stipulated a topsoil testing frequency of one sample per 100m³ with a minimum of three samples per source. Topsoil testing would be undertaken during subsequent verification visits.

The subsoil matched the description provided in the Tim O'Hare Associates report. As the material was 'as dug' there was no need to test for pesticides (this would only have been undertaken for material(s) imported from a third party site).

The samples were placed in laboratory supplied containers and couriered in cool boxes to The Environmental Laboratory at their facility in East Sussex. All samples were subjected to heavy metals, polycyclic aromatic hydrocarbon, pH, total organic carbon and asbestos testing in accordance with Table BI (RMS Appendix B). Where available, tests are MCERTS accredited.

2) 4th March 2022

Heavy rain had restricted progress and topsoil importation had not yet commenced. An additional two samples of subsoil were taken.

3) 16th March 2022

The area to the right-hand side of the site entrance was filled with subsoil and topsoil as far back as the retaining wall. A smaller area to the left-hand side of the site entrance was also complete from a clean cover infill standpoint. Gabions were being completed at the rear of the site and the communal 'shed' had been re-erected. The completed regions of the site also had some small trees and larger shrubs re-planted. Photographs are included as Appendix B. Six samples of topsoil were taken: five from in-situ locations all at just below surface level (0.0-0.1m bgl). Four samples were taken to the right of the site entrance and one was taken to the left of the site entrance. The sixth sample was taken from a small stockpile of topsoil present on the edge of the completed area to the left of the site entrance.

The RMS stipulated a topsoil testing frequency of one sample per 100m³ with a minimum of three samples per source. Thus further topsoil testing would be undertaken during subsequent verification visits.

The topsoil matched the description provided in the Tim O'Hare Associates report. As the material was a manufactured product there was no need to test for pesticides (this would only have been undertaken for material(s) imported from a third party site). It was also deemed unnecessary to subject the topsoil to a BS3882 compliance test as this was undertaken by Tim O'Hare Associates previously.

The samples were placed in laboratory supplied containers and couriered in cool boxes to The Environmental Laboratory at their facility in East Sussex. All samples were subjected to heavy metals, polycyclic aromatic hydrocarbon, pH, total organic carbon and asbestos testing in accordance with Table BI (RMS Appendix B). Where available, tests are MCERTS accredited.

4) 5th April

Verification of clean cover thickness was undertaken on 5th April. Subsoil had been placed across the entire site. Topsoil had been placed across everywhere except a small area near the site entrance. Works were underway to place topsoil in this final area. Trial holes were dug across the site with at least 1 pit excavated per plot. Table 1 lists the findings of the inspection pits. Photographs of example inspection pits are included in Appendix C. The RMS stated that a thickness of topsoil >300mm and subsoil >200mm was required across the site.

Table 1: Clean Cover Thicknesses

Plot	Topsoil Thickness (m)	Subsoil Thickness (m)	Depth of Membrane (m)
I	0.33	0.17	0.50
Ia	0.40	0.15	0.55
2a	0.30	0.18	0.48
2b	0.37	0.13	0.50
3a	0.31	0.25	0.56
3b	0.30	0.18	0.48
4	0.36	0.15	0.51
5a	0.25	0.23	0.48
5b	0.31	0.24	0.55
6	0.40	0.12	0.52
6a	0.30	0.21	0.51
7	0.34	0.16	0.50
8a	0.31	0.19	0.50
8b	0.35	0.17	0.52
9	0.37	0.19	0.56
10a	0.50	0.18	0.68
10b	0.34	0.30	0.64
11a	0.3	0.26	0.56
11b	0.36	0.17	0.53
12	0.32	0.13	0.45
13	0.38	0.23	0.61
14	0.39	0.22	0.61
15a	0.37	0.18	0.55
15b	0.30	0.26	0.56

16a	0.39	0.19	0.58
16b	0.48	0.12	0.60
17a	0.37	0.13	0.50
17b	0.38	0.22	0.60
18	0.28	0.19	0.47
19a	0.3	0.18	0.48
19b	0.3	0.14	0.44
20	0.3	0.18	0.48

Six additional samples of topsoil were taken, bringing the total number of samples tested up to 12 No. as per requirements set out in the RMS.

The samples were placed in laboratory supplied containers and couriered in cool boxes to The Environmental Laboratory at their facility in East Sussex. All samples were subjected to heavy metals, polycyclic aromatic hydrocarbon, pH, total organic carbon and asbestos testing in accordance with Table B1 (RMS Appendix B). Where available, tests are MCERTS accredited.

5) 5th May

All works had been completed on site and the contractor had demobilised. Additional inspection pits were excavated to delineate the extent of elevated arsenic identified within plot 19b during the previous inspection. 15 No. additional samples of topsoil were taken, 3 No. from plot 18, 6 No. from plot 19a and 6 No. from plot 19b.

9.3 Geo-chemical test results

All samples of subsoil which were tested were found to meet the criteria set out in Table B1 of the RMS.

Of the 12 No. initial samples of Topsoil which were tested a single sample taken on 5th April (plot 19b) was found to just exceed the specified criteria for Arsenic (44.1mg/kg against an import criteria of 37mg/kg). The remainder of the samples met all the criteria.

The single topsoil sample was re-tested at the laboratory and the result was confirmed. Following this test result, additional sampling and testing was undertaken in plot 19b and adjacent plots 18 and 19a on the 5th May. One further minor exceedance against the import criteria for arsenic was recorded in plot 19a (47.9mg/kg against an import criteria of 37mg/kg), at a location near to the sample location where the elevation was recorded in plot 19b.

It is likely that the elevated levels of arsenic in that section of the allotment plot are due to naturally elevated levels of arsenic within the sand which is part of the make-up of manufactured topsoil. Bioavailability testing undertaken in the past by LEAP in similar instances

has demonstrated that only a small proportion of arsenic of this nature is bioavailable (i.e. chemically available in such a form that it can be absorbed by plants). Of the 16 clean cover verification samples taken in the area around the identified elevation in plot 19b (1 No. from the original sampling and 15 No. from the secondary sampling) the average concentration of arsenic was 27.5mg/kg. Within plot 19a the average concentration was 27.6mg/kg and within plot 19b the average concentration was 27.0mg/kg. This is below the import criteria of 37 mg/kg.

10 Conclusions

The thickness of clean cover soils which have been placed across the site complies with the requirements set out in the RMS.

The geochemical quality of the imported clean cover soils complies with the requirements set out in the RMS apart from a small area located at the southwestern corner of plot 19b/southeastern corner of plot 19a. In this area a minor exceedance of the specified import criteria for arsenic has been identified. Whilst the average concentrations in both the individual plots and across the locale are well below the import criteria it is recommended that the topsoil in an area of approximately 7mx3m at this location is excavated, removed from site and replaced with fresh clean material in order to demonstrate that the remediation across the site has been completed fully in accordance with requirements.

It is considered that once these minor additional works have been completed that the remediation for the site will have been completed successfully in accordance with the RMS and that no unacceptable risks remain to the identified receptors.

APPENDIX A – LIMITATIONS

Limitations

LIMITATIONS

This report is confidential to the Client and Leap Environmental Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental Ltd 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.

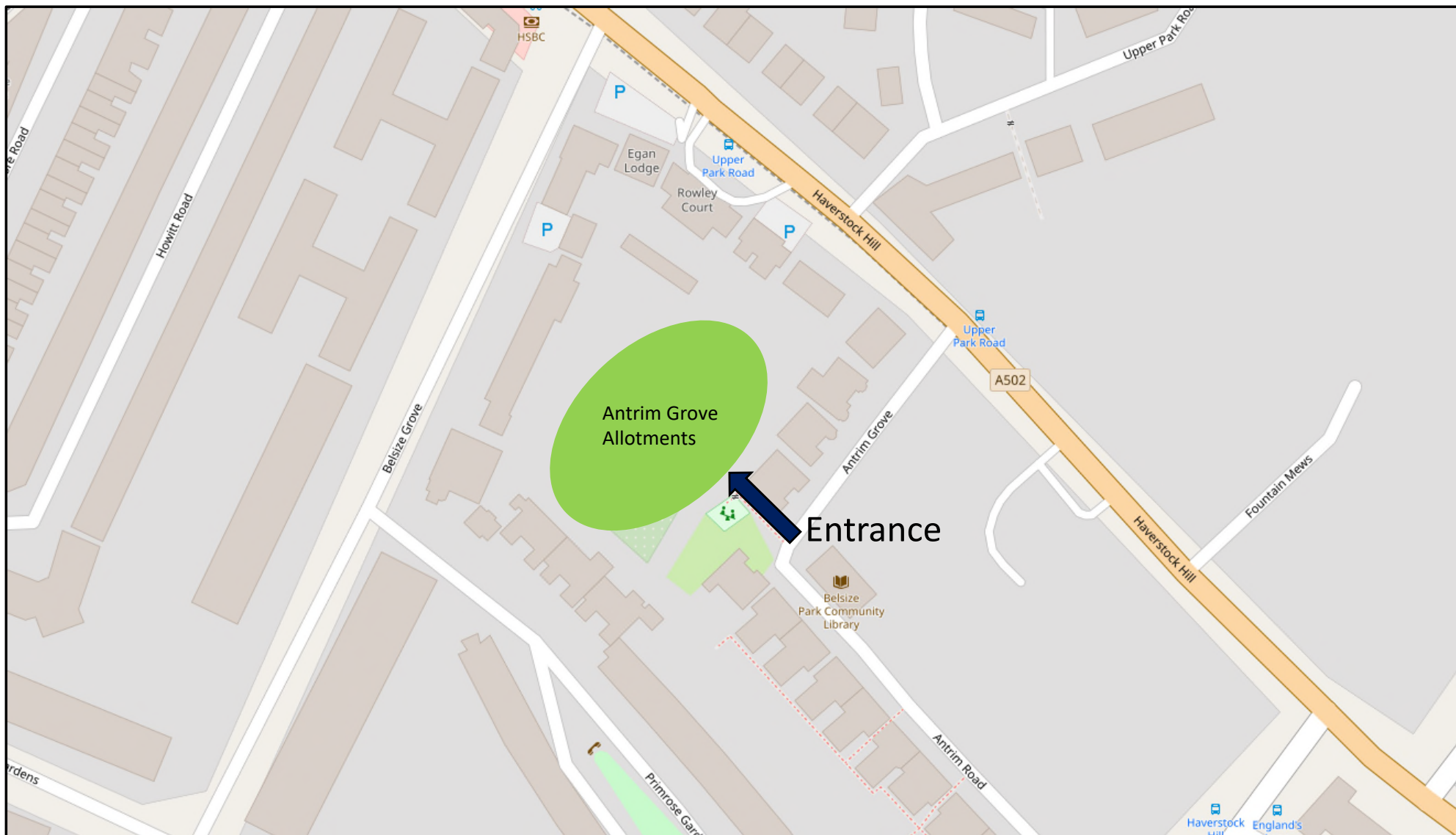
This report has been prepared by Leap Environmental Ltd on the basis of information received from a variety of sources which Leap Environmental Ltd believes to be accurate. Nevertheless, Leap Environmental Ltd cannot and does not guarantee the authenticity or reliability of the information it has obtained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

Leap Environmental Ltd 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.

APPENDIX B – FIGURES

Figures



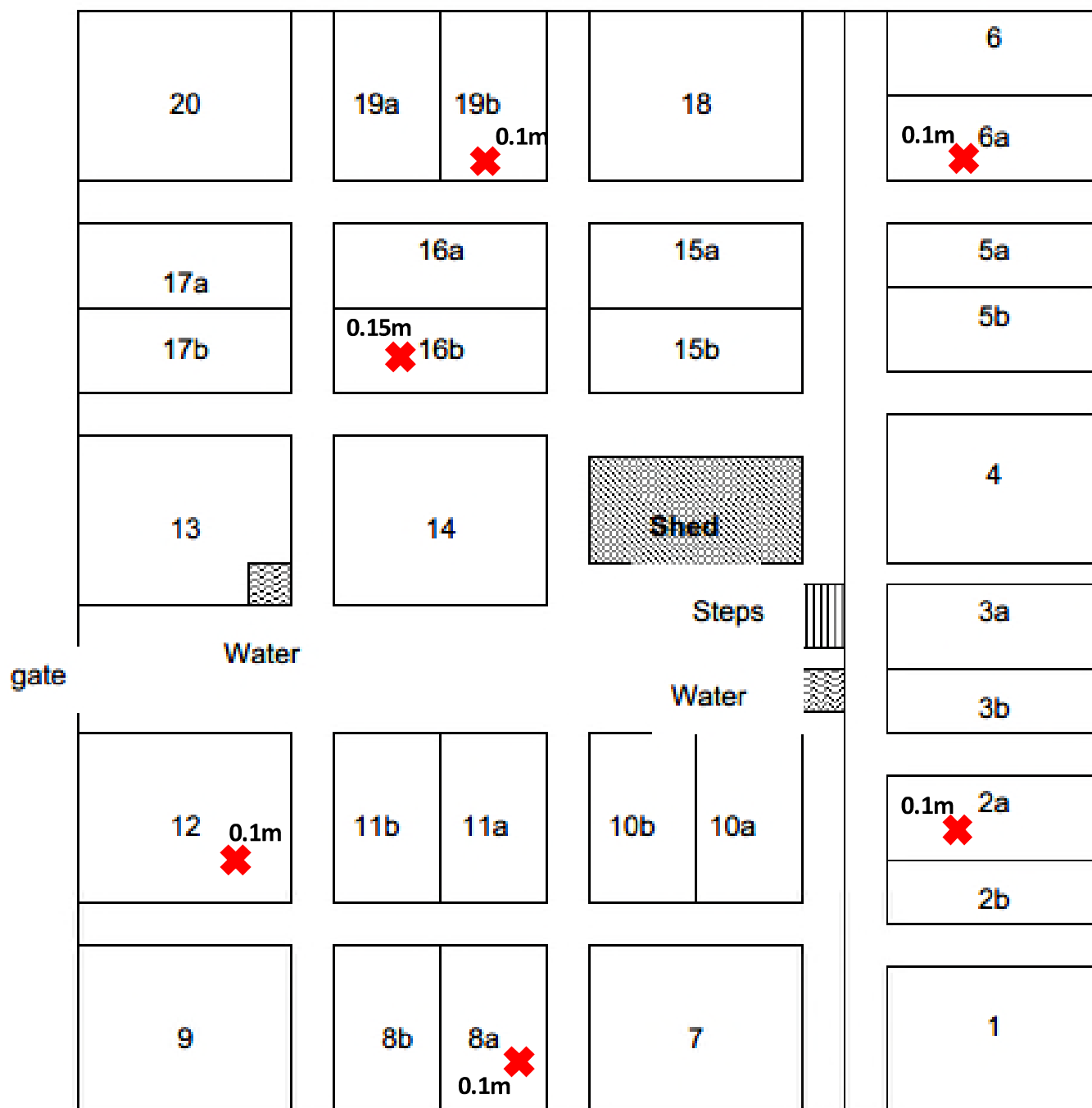
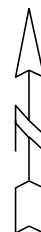
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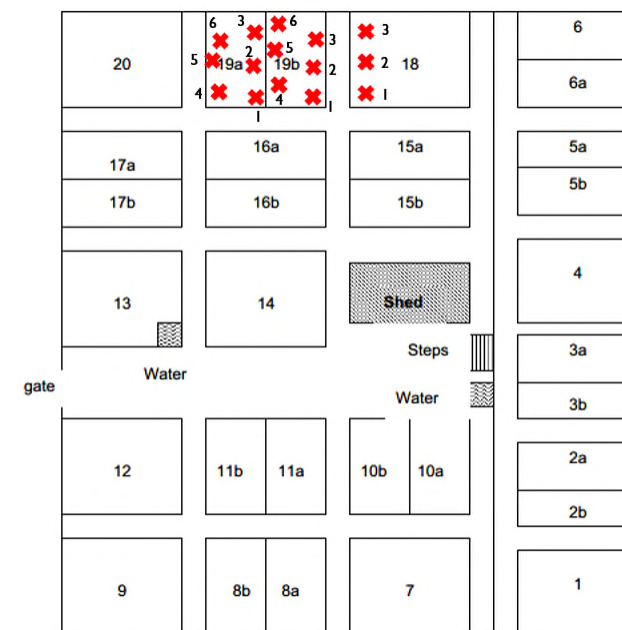
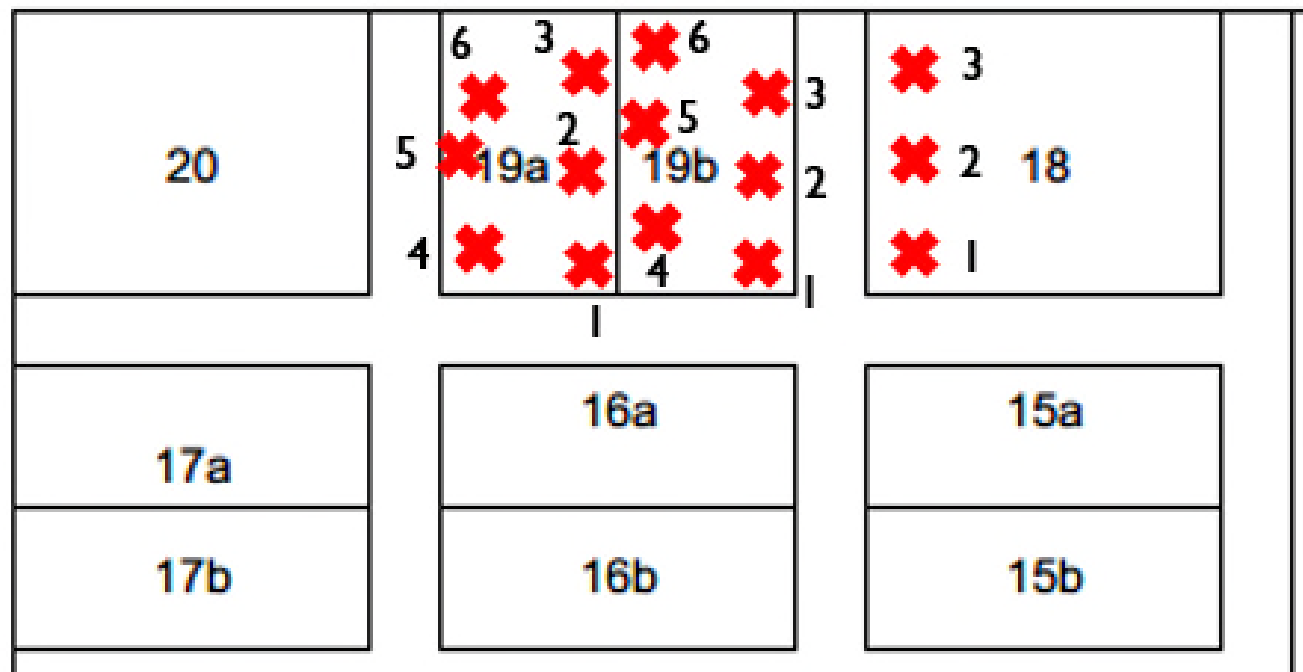
Client:	London Borough of Camden	Date:	23/06/2020	Project ID:	LP2248
Project:	Antrim Grove	Title:	Site Location Plan	Fig. No.	1



Sample Locations



✖ Sample Locations
(0 – 0.3m depth)



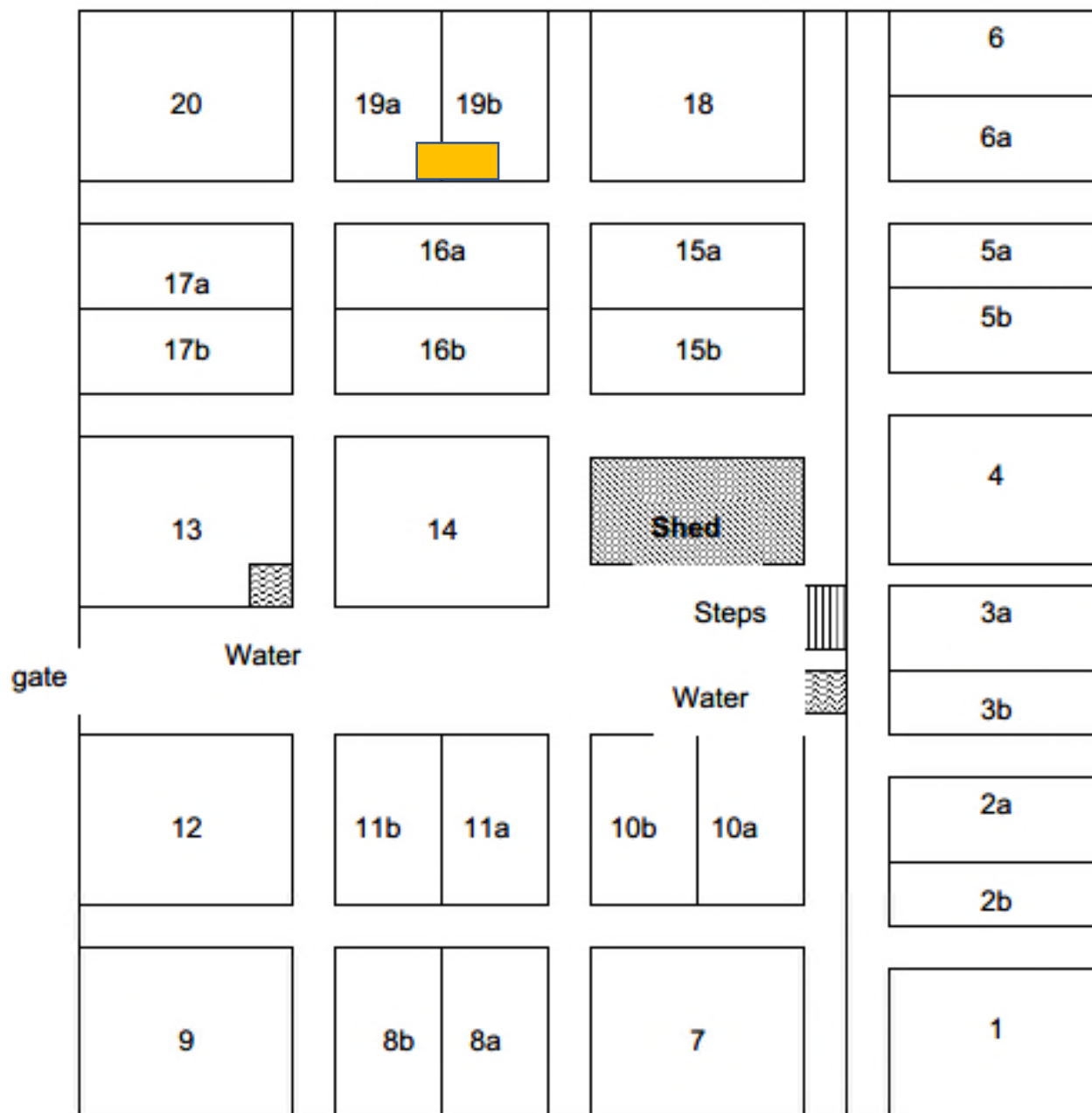
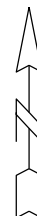
Basemap: Antrim Grove Allotments Plan



Client:	London Borough of Camden	Date:	05/05/2022	Project ID:	LP2248
Project:	Antrim Grove Allotments	Title:	Sample Location Plan	Fig. No.	3



**Excavation and
replacement of topsoil
recommended**



Client: London Borough of Camden

Date: 20/06/2022

Project ID: LP2248

Project: Antrim Grove Allotments

Title: Area recommended for topsoil excavation and replacement

Fig. No. 4

APPENDIX C – PHOTOGRAPHS

Photographs



Plate 1: VISIT 15/02/22 – View of site looking west. Site cleared apart from a nursery bed. Central region of the photograph was the location of the communal shed



Plate 2: VISIT 15/02/22 – Gabions under construction in the northern regions of the site



Plate 3: VISIT 15/02/22 – View looking east showing subsoil application over membrane in the southeast of the site



Plate 4: VISIT 15/02/22 – Confirmation of Gabion height – 500mm



Plate 5: VISIT 15/02/22 – Confirmation of Gabion height in location of former retaining wall – 1,000mm



Plate 6: VISIT 15/02/22 – View of the southwest of the site



Plate 7: VISIT 15/02/22 – Subsoil being applied over membrane in the southeast of the site. Verification samples taken from this area (#2) and from the stockpile in the background (#2)



Plate 8: VISIT 15/02/22 – Membrane specification



Plate 9: VISIT 16/03/22 – Plots to the right of the site entrance (east of the site) with clean cover applied and selected trees and shrubs re-planted



Plate 10: VISIT 16/03/22 – Plots to the left of the site entrance with clean cover applied and selected trees and shrubs temporarily re-planted as a nursery bed



Plate 11: VISIT 16/03/22 – Gabion wall construction at the rear of the site



Plate 12: VISIT 16/03/22 – Communal shed re-constructed in the central region of the site



Plate 13: VISIT 05/04/22 – Plots to the north of the site with topsoil and turf boundaries placed.



Plate 14: VISIT 05/04/22 – Western boundary



Plate 15: VISIT 05/04/22 – example inspection pit (Plot 1) showing 500mm cover



Plate 16: VISIT 05/04/22 – example inspection pit (plot 16a) showing 500mm cover



Plate 17: VISIT 05/04/22 – example inspection pit (plot 15b) showing 500mm cover



Plate 18: VISIT 05/04/22 – example inspection pit (plot 11a) showing 500mm cover



Plate 19: VISIT 05/04/22 – example inspection pit (plot 8b) showing 500mm cover



Plate 20: VISIT 05/04/22 – example inspection pit (plot 17b) showing 500mm cover



Plate 21: VISIT 05/05/22 – plots 18 & 19



Plate 22: VISIT 05/05/22 – additional sampling locations plot 19.

APPENDIX D – LABORATORY TEST CERTIFICATES

Laboratory Test
Certificates



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 22-38813

Issue: 1

Date of Issue: 25/02/2022

Contact: Paul Adams

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Quotation No: Q14-00063


Order No: LPO-5219

Customer Reference: LP2248

Date Received: 17/02/2022

Date Approved: 25/02/2022

Details: Antrim Grove Allotments

Approved by: 

Mike Varley, General Manager

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Sample Summary

Report No.: 22-38813, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
268796	Subsoil Sample 1	15/02/2022	17/02/2022	Sand	
268797	Subsoil Sample 2	15/02/2022	17/02/2022	Sand	
268798	Subsoil Sample 3	15/02/2022	17/02/2022	Sand	
268799	Subsoil Sample 4	15/02/2022	17/02/2022	Sand	



Results Summary

2683

Report No.: 22-38813, issue number 1

ELAB Reference	268796	268797	268798	268799
Customer Reference				
Sample ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sample Location	Subsoil Sample 1	Subsoil Sample 2	Subsoil Sample 3	Subsoil Sample 4
Sample Depth (m)				
Sampling Date	15/02/2022	15/02/2022	15/02/2022	15/02/2022

Determinand	Codes	Units	LOD				
Soil sample preparation parameters							
Moisture Content	N	%	0.1	8.3	7.9	7.0	7.4
Material removed	N	%	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None	None	None
Metals							
Arsenic	M	mg/kg	1	23.7	26.0	22.2	23.5
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	58.3	58.4	55.4	59.1
Copper	M	mg/kg	5	9.3	9.2	8.8	8.3
Lead	M	mg/kg	5	5.8	12.0	5.6	5.5
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	31.8	32.3	30.0	32.3
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	38.0	40.8	35.2	37.1
Inorganics							
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8



Results Summary

2683

Report No.: 22-38813, issue number 1

ELAB Reference	268796	268797	268798	268799
Customer Reference				
Sample ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sample Location	Subsoil Sample 1	Subsoil Sample 2	Subsoil Sample 3	Subsoil Sample 4
Sample Depth (m)				
Sampling Date	15/02/2022	15/02/2022	15/02/2022	15/02/2022

Determinand	Codes	Units	LOD				
Miscellaneous							
pH	M	pH units	0.1	7.9	7.8	7.8	7.6
Total Organic Carbon	N	%	0.01	0.04	0.03	0.03	0.03
Polycyclic aromatic hydrocarbons							
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total PAH(16)	M	mg/kg	0.4	< 0.4	< 0.4	< 0.4	< 0.4



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Results Summary

Report No.: 22-38813, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos	Gravimetric Analysis Total	Gravimetric Analysis by ACM Type	Free Fibre Analysis	Total Asbestos
268796		Subsoil Sample 1	Loamy sand	No asbestos detected	n/t	n/t	n/t	n/t
268797		Subsoil Sample 2	Loamy sand	No asbestos detected	n/t	n/t	n/t	n/t
268798		Subsoil Sample 3	Loamy sand	No asbestos detected	n/t	n/t	n/t	n/t
268799		Subsoil Sample 4	Loamy sand	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 22-38813, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	21/02/2022	110	Colorimetry
pH	M	Air dried sample	23/02/2022	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	21/02/2022	118	ICPMS
PAH (GC-FID)	M	As submitted sample	21/02/2022	133	GC-FID
Total organic carbon/Total sulphur	N	Air dried sample	22/02/2022	210	IR
Asbestos identification	U	Air dried sample	25/02/2022	280	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 22-38813, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	<p>LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.</p> <p>Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.</p> <p>ELAB are unable to provide an interpretation or opinion on the content of this report.</p> <p>The results relate only to the sample received.</p> <p>PCB congener results may include any coeluting PCBs</p> <p>Uncertainty of measurement for the determinands tested are available upon request</p> <p>Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.</p>

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry



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info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 22-39184

Issue: 1

Date of Issue: 14/03/2022

Contact: Paul Adams

Customer Details: Leap Environmental Ltd
Book House
Glebelands Centre
Dorking
Surrey RH4 3HW

Quotation No: Q14-00063


Order No: LPO-5323

Customer Reference: LP2248

Date Received: 07/03/2022

Date Approved: 14/03/2022

Details: Antrim Grove Allotments

Approved by: 

Mike Varley, General Manager

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Sample Summary

Report No.: 22-39184, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
270595	Spile Sample 1 Subsoil Sample	04/03/2022	07/03/2022	Sandy loam	
270596	Spile Sample 2 Subsoil Sample	04/03/2022	07/03/2022	Sandy loam	

Results Summary

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Report No.: 22-39184, issue number 1

ELAB Reference	270595	270596
Customer Reference	Subsoil Sample 5	Subsoil Sample 6
Sample ID		
Sample Type	SOIL	SOIL
Sample Location	Stockpile Sample 1	Stockpile Sample 2
Sample Depth (m)		
Sampling Date	04/03/2022	04/03/2022

Determinand	Codes	Units	LOD		
Soil sample preparation parameters					
Moisture Content	N	%	0.1	11.6	12.7
Material removed	N	%	0.1	16.5	19.2
Description of Inert material removed	N		0	Stones/Wood	Stones/Brick/Wood
Metals					
Arsenic	M	mg/kg	1	8.0	8.3
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	14.8	15.5
Copper	M	mg/kg	5	21.5	19.7
Lead	M	mg/kg	5	18.3	17.4
Mercury	M	mg/kg	0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	11.0	11.6
Selenium	M	mg/kg	1	< 1.0	< 1.0
Zinc	M	mg/kg	5	44.3	43.1
Inorganics					
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8
Miscellaneous					
pH	M	pH units	0.1	8.3	8.3
Total Organic Carbon	N	%	0.01	1.4	1.3
Polyaromatic hydrocarbons					
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	0.1	0.1
Anthracene	M	mg/kg	0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	0.1	0.1
Pyrene	M	mg/kg	0.1	0.2	0.1
Benzo(a)anthracene	M	mg/kg	0.1	< 0.1	0.3
Chrysene	M	mg/kg	0.1	< 0.1	0.3
Benzo(b)fluoranthene	M	mg/kg	0.1	< 0.1	0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	< 0.1	0.1
Benzo(a)pyrene	M	mg/kg	0.1	< 0.1	0.2
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	< 0.1	0.3
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	< 0.1	0.4
Total PAH(16)	M	mg/kg	0.4	0.6	2.2



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Results Summary

Report No.: 22-39184, issue number 1

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos	Gravimetric Analysis Total	Gravimetric Analysis by ACM Type	Free Fibre Analysis	Total Asbestos
270595		Stockpile Sample 1 Subsoil Sample 5	Brown sandy soil, plant-material,	No asbestos detected	n/t	n/t	n/t	n/t
270596		Stockpile Sample 2 Subsoil Sample 6	Brown sandy soil, plant-material,	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 22-39184, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	10/03/2022	110	Colorimetry
pH	M	Air dried sample	11/03/2022	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	09/03/2022	118	ICPMS
PAH (GC-FID)	M	As submitted sample	09/03/2022	133	GC-FID
Total organic carbon/Total sulphur	N	Air dried sample	10/03/2022	210	IR
Asbestos identification	U	Air dried sample	14/03/2022	280	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 22-39184, issue number 1

Key

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N	do not currently hold UKAS accreditation
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SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	<p>LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.</p> <p>Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.</p> <p>ELAB are unable to provide an interpretation or opinion on the content of this report.</p> <p>The results relate only to the sample received.</p> <p>PCB congener results may include any coeluting PCBs</p> <p>Uncertainty of measurement for the determinands tested are available upon request</p> <p>Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.</p>

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 22-39405

Issue: 1

Date of Issue: 24/03/2022

Contact: Paul Adams

Customer Details: Leap Environmental Ltd
Book House
Glebelands Centre
Dorking
Surrey RH4 3HW

Quotation No: Q14-00063


Order No: LPO-5378

Customer Reference: LP2248

Date Received: 17/03/2022

Date Approved: 24/03/2022

Details: Antrim Grove Allotments

Approved by: 

Mike Varley, General Manager

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Sample Summary

Report No.: 22-39405, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
271597	Topsoil Sample 1 0.00 - 0.10	16/03/2022	17/03/2022	Sandy silty loam	
271598	Topsoil Sample 2 0.00 - 0.10	16/03/2022	17/03/2022	Sandy silty loam	
271599	Topsoil Sample 3 0.00 - 0.10	16/03/2022	17/03/2022	Sandy silty loam	
271600	Topsoil Sample 4 0.00 - 0.10	16/03/2022	17/03/2022	Sandy silty loam	
271601	Topsoil Sample 5 0.00 - 0.10	16/03/2022	17/03/2022	Sandy silty loam	
271602	Topsoil Sample 6 0.00 - 0.10	16/03/2022	17/03/2022	Sandy silty loam	



Results Summary

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Report No.: 22-39405, issue number 1

Report No.: 22-05466, Issue Number: 1

ELAB Reference	271597	271598	271599	271600	271601	271602			
Customer Reference									
Sample ID									
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Location	Topsoil Sample 1	Topsoil Sample 2	Topsoil Sample 3	Topsoil Sample 4	Topsoil Sample 5	Topsoil Sample 6			
Sample Depth (m)	0.00 - 0.10	0.00 - 0.10	0.00 - 0.10	0.00 - 0.10	0.00 - 0.10	0.00 - 0.10			
Sampling Date	16/03/2022	16/03/2022	16/03/2022	16/03/2022	16/03/2022	16/03/2022			
Determinand	Codes	Units	LOD						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	19.3	20.8	17.9	16.6	16.0	14.7
Material removed	N	%	0.1	15.1	14.9	12.1	12.9	12.6	15.2
Description of Inert material removed	N		0	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood
Metals									
Arsenic	M	mg/kg	1	17.4	17.5	14.1	11.6	19.8	23.7
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	34.3	32.1	27.4	23.6	26.7	44.9
Copper	M	mg/kg	5	37.7	29.4	30.5	34.5	26.5	36.1
Lead	M	mg/kg	5	46.9	32.5	39.3	30.3	33.8	39.4
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	24.3	23.4	19.8	16.9	22.5	29.5
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	96.4	79.5	84.5	69.8	76.0	95.7
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Miscellaneous									
pH	M	pH units	0.1	8.2	8.3	8.1	8.0	8.1	8.0
Total Organic Carbon	N	%	0.01	1.1	1.4	2.0	1.6	1.4	1.8



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Results Summary

Report No.: 22-39405, issue number 1

ELAB Reference	271597	271598	271599	271600	271601	271602
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	Topsoil Sample 1	Topsoil Sample 2	Topsoil Sample 3	Topsoil Sample 4	Topsoil Sample 5	Topsoil Sample 6
Sample Depth (m)	0.00 - 0.10	0.00 - 0.10	0.00 - 0.10	0.00 - 0.10	0.00 - 0.10	0.00 - 0.10
Sampling Date	16/03/2022	16/03/2022	16/03/2022	16/03/2022	16/03/2022	16/03/2022
Determinand	Codes	Units	LOD			
Polyaromatic hydrocarbons						
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Pyrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Chrysene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1
Total PAH(16)	M	mg/kg	0.4	< 0.4	< 0.4	< 0.4



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Results Summary
Report No.: 22-39405, issue number 1

Asbestos Results

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in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
271597	0.00 - 0.10	Topsoil Sample 1	Brown sandy Soil,Twigs	No asbestos detected	n/t	n/t	n/t	n/t
271598	0.00 - 0.10	Topsoil Sample 2	Brown sandy soil,Twigs	No asbestos detected	n/t	n/t	n/t	n/t
271599	0.00 - 0.10	Tposoil Sample 3	Brown sandy soil,Twigs	No asbestos detected	n/t	n/t	n/t	n/t
271600	0.00 - 0.10	Topsoil Sample 4	Brown sandy Soil,Twigs,Stones	No asbestos detected	n/t	n/t	n/t	n/t
271601	0.00 - 0.10	Topsoil Sample 5	Brown sandy Soil,Twigs	No asbestos detected	n/t	n/t	n/t	n/t
271602	0.00 - 0.10	Topsoil Sample 6	Brown Sandy soil,Stones,Twigs	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 22-39405, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	21/03/2022	110	Colorimetry
pH	M	Air dried sample	24/03/2022	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	21/03/2022	118	ICPMS
PAH (GC-FID)	M	As submitted sample	21/03/2022	133	GC-FID
Total organic carbon/Total sulphur	N	Air dried sample	22/03/2022	210	IR
Asbestos identification	U	Air dried sample	23/03/2022	280	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 22-39405, issue number 1

Key

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SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	<p>LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.</p> <p>Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.</p> <p>ELAB are unable to provide an interpretation or opinion on the content of this report.</p> <p>The results relate only to the sample received.</p> <p>PCB congener results may include any coeluting PCBs</p> <p>Uncertainty of measurement for the determinands tested are available upon request</p> <p>Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.</p>

Deviation Codes

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g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

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All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

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HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
-	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 22-39829

Issue: 2. Replaces Analytical Report number 22-39829; issue no.1

Date of Issue: 21/04/2022

Contact: James Sugden

Customer Details: Leap Environmental Ltd
Book House
Glebelands Centre
Dorking
Surrey RH4 3HW

Quotation No: Q22-02626

Order No: LPO-5509

Customer Reference: LP2248

Date Received: 06/04/2022

Date Approved: 21/04/2022

Details: Antrim Grove Allotments

Approved by:

Tim Reeve, Quality Officer

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)

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Sample Summary

Report No.: 22-39829, issue number 2

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
274210	Plot 2a 0.10	05/04/2022	06/04/2022	Sandy silty loam	
274211	Plot 6a 0.10	05/04/2022	06/04/2022	Sandy silty loam	
274212	Plot 8a 0.10	05/04/2022	06/04/2022	Sandy silty loam	
274213	Plot 12 0.10	05/04/2022	06/04/2022	Sandy silty loam	
274214	Plot 16b 0.15	05/04/2022	06/04/2022	Sandy silty loam	
274215	Plot 19b 0.10	05/04/2022	06/04/2022	Sandy silty loam	



Results Summary

2683

Report No.: 22-39829, issue number 2

Report No. 22-00020, Issue Number: 2

ELAB Reference				274210	274211	274212	274213	274214	274215
Customer Reference									
Sample ID									
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				Plot 2a	Plot 6a	Plot 8a	Plot 12	Plot 16b	Plot 19b
Sample Depth (m)				0.10	0.10	0.10	0.10	0.15	0.10
Sampling Date				05/04/2022	05/04/2022	05/04/2022	05/04/2022	05/04/2022	05/04/2022
Determinand	Codes	Units	LOD						
Soil sample preparation parameters									
Moisture Content	N	%	0.1	7.4	9.7	15.3	14.1	8.9	8.7
Material removed	N	%	0.1	10.3	17.4	17.3	13.1	13.8	13.5
Description of Inert material removed	N		0	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood
Metals									
Arsenic	M	mg/kg	1	23.9	19.1	14.1	11.7	21.9	44.1
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	33.7	27.6	25.2	21.4	35.2	42.7
Copper	M	mg/kg	5	49.8	47.3	35.7	20.8	35.4	43.5
Lead	M	mg/kg	5	35.1	31.6	30.0	19.9	37.0	31.1
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	27.4	22.8	19.8	15.4	26.6	35.3
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	96.2	88.9	81.1	53.0	94.8	99.3
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Miscellaneous									
pH	M	pH units	0.1	9.0	8.9	9.1	8.9	9.1	9.0
Total Organic Carbon	N	%	0.01	1.4	1.4	1.8	10	1.4	1.2



Results Summary

2683

Report No.: 22-39829, issue number 2

ELAB Reference	274210	274211	274212	274213	274214	274215
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	Plot 2a	Plot 6a	Plot 8a	Plot 12	Plot 16b	Plot 19b
Sample Depth (m)	0.10	0.10	0.10	0.10	0.15	0.10
Sampling Date	05/04/2022	05/04/2022	05/04/2022	05/04/2022	05/04/2022	05/04/2022

Determinand	Codes	Units	LOD						
Polyaromatic hydrocarbons									
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	< 0.1	0.3	0.5	< 0.1	0.1	< 0.1
Pyrene	M	mg/kg	0.1	< 0.1	0.1	0.2	< 0.1	0.2	0.2
Benzo(a)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Chrysene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	0.3	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	< 0.1	< 0.1	0.3	< 0.1	< 0.1	< 0.1
Total PAH(16)	M	mg/kg	0.4	< 0.4	0.6	2.3	< 0.4	< 0.4	< 0.4



Unit A2, Windmill Road, Ponswood Industrial Estate, St Leonards on Sea, East Sussex, TN38 9BY

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Results Summary

Report No.: 22-39829, issue number 2

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
274210	0.10	Plot 2a	Brown sandy soil, stones, organics	No asbestos detected	n/t	n/t	n/t	n/t
274211	0.10	Plot 6a	Brown sandy soil, stones, clinker, organics	No asbestos detected	n/t	n/t	n/t	n/t
274212	0.10	Plot 8a	Brown sandy soil, stones, clinker, organics	No asbestos detected	n/t	n/t	n/t	n/t
274213	0.10	Plot 12	Brown sandy soil, stones, clinker, organics	No asbestos detected	n/t	n/t	n/t	n/t
274214	0.15	Plot 16b	Brown sandy soil, stones, clinker, organics	No asbestos detected	n/t	n/t	n/t	n/t
274215	0.10	Plot 19b	Brown sandy soil, stones, organics	No asbestos detected	n/t	n/t	n/t	n/t



Method Summary

Report No.: 22-39829, issue number 2

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	08/04/2022	110	Colorimetry
pH	M	Air dried sample	13/04/2022	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	11/04/2022	118	ICPMS
PAH (GC-FID)	M	As submitted sample	08/04/2022	133	GC-FID
Total organic carbon/Total sulphur	N	Air dried sample	11/04/2022	210	IR
Asbestos identification	U	Air dried sample	13/04/2022	280	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 22-39829, issue number 2

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	<p>LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.</p> <p>Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.</p> <p>ELAB are unable to provide an interpretation or opinion on the content of this report.</p> <p>The results relate only to the sample received.</p> <p>PCB congener results may include any coeluting PCBs</p> <p>Uncertainty of measurement for the determinands tested are available upon request</p> <p>Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.</p>

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
 All water samples will be retained for 7 days following the date of the test report
 Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
-	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry



2683



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THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 22-40389

Issue: 1

Date of Issue: 12/05/2022

Contact: Harry Punter

Customer Details: Leap Environmental Ltd
Book House
Glebelands Centre
Dorking
Surrey RH4 3HW

Quotation No: Q22-02626


Order No: LPO-5709

Customer Reference: LP2248

Date Received: 06/05/2022

Date Approved: 12/05/2022

Details: Antrim Grove Allotments

Approved by: 

Mike Varley, General Manager

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Sample Summary

Report No.: 22-40389, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
277890	Plot 18 Sample 1 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277891	Plot 18 Sample 2 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277892	Plot 18 Sample 3 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277893	Plot 19a Sample 1 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277894	Plot 19a Sample 2 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277895	Plot 19a Sample 3 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277896	Plot 19a Sample 4 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277897	Plot 19a Sample 5 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277898	Plot 19a Sample 6 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277899	Plot 19b Sample 1 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277900	Plot 19b Sample 2 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277901	Plot 19b Sample 3 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277902	Plot 19b Sample 4 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277903	Plot 19b Sample 5 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	
277904	Plot 19b Sample 6 0.00 - 0.30	05/05/2022	06/05/2022	Sandy silty loam	

Results Summary

Report No.: 22-40389, issue number 1

ELAB Reference Customer Reference Sample ID Sample Type Sample Location Sample Depth (m) Sampling Date				277890	277891	277892	277893	277894	277895	277896	277897
				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Plot 18 Sample 1	Plot 18 Sample 2	Plot 18 Sample 3	Plot 19a Sample 1	Plot 19a Sample 2	Plot 19a Sample 3	Plot 19a Sample 4	Plot 19a Sample 5
				0.00 - 0.30	0.00 - 0.30	0.00 - 0.30	0.00 - 0.30	0.00 - 0.30	0.00 - 0.30	0.00 - 0.30	0.00 - 0.30
				05/05/2022	05/05/2022	05/05/2022	05/05/2022	05/05/2022	05/05/2022	05/05/2022	05/05/2022
Determinand	Codes	Units	LOD								
Soil sample preparation parameters											
Moisture Content	N	%	0.1	10.6	10.5	10.8	11.7	12.7	11.7	11.8	12.5
Material removed	N	%	0.1	13.9	13.4	10.2	16.3	16.8	22.4	13.8	15.7
Description of Inert material removed	N		0	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood	Stones/Wood
Metals											
Arsenic	M	mg/kg	1	29.8	23.4	31.8	47.9	20.9	21.5	24.5	24.8
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	34.6	32.3	35.3	34.8	30.0	29.9	32.9	33.1
Copper	M	mg/kg	5	27.9	25.7	28.8	25.5	26.3	29.9	29.4	28.4
Lead	M	mg/kg	5	43.1	35.7	39.2	33.7	32.6	25.6	40.5	35.9
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	28.8	26.8	32.0	33.5	25.6	26.4	28.9	29.0
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	93.9	88.9	95.7	101	83.5	79.2	98.5	98.7

Results Summary

Report No.: 22-40389, issue number 1

ELAB Reference				277898	277899	277900	277901	277902	277903	277904
Customer Reference										
Sample ID										
Sample Type				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location				Plot 19a Sample 6	Plot 19b Sample 1	Plot 19b Sample 2	Plot 19b Sample 3	Plot 19b Sample 4	Plot 19b Sample 5	Plot 19b Sample 6
Sample Depth (m)				0.00 - 0.30	0.00 - 0.30	0.00 - 0.30	0.00 - 0.30	0.00 - 0.30	0.00 - 0.30	0.00 - 0.30
Sampling Date				05/05/2022	05/05/2022	05/05/2022	05/05/2022	05/05/2022	05/05/2022	05/05/2022
Determinand	Codes	Units	LOD							
Soil sample preparation parameters										
Moisture Content	N	%	0.1	11.2	12.7	13.6	11.4	11.8	10.8	11.6
Material removed	N	%	0.1	21.4	17.4	13.7	20.2	13.0	13.5	15.8
Description of Inert material removed	N		0	Stones/Wood	Stones/Brick/Wood	Stones/Wood	Stones/Wood	Stones/Brick/Wood	Stones/Wood	Stones/Wood
Metals										
Arsenic	M	mg/kg	1	26.0	19.8	19.9	29.9	25.1	24.8	25.5
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	33.1	30.1	29.1	39.2	35.0	35.2	29.6
Copper	M	mg/kg	5	24.6	25.3	24.6	32.8	34.4	23.6	21.0
Lead	M	mg/kg	5	36.0	41.1	35.9	34.5	40.9	38.9	28.5
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	29.8	26.5	24.9	33.0	29.4	30.2	26.2
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	93.4	97.3	88.9	99.1	101	90.6	78.0



2683

Method Summary

Report No.: 22-40389, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Aqua regia extractable metals	M	Air dried sample	11/05/2022	118	ICPMS

Report Information

Report No.: 22-40389, issue number 1

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	<p>LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.</p> <p>Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.</p> <p>ELAB are unable to provide an interpretation or opinion on the content of this report.</p> <p>The results relate only to the sample received.</p> <p>PCB congener results may include any coeluting PCBs</p> <p>Uncertainty of measurement for the determinands tested are available upon request</p> <p>Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.</p>

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
-	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

APPENDIX E – MATERIALS IMPORT DOCUMENTATION

Materials Import
Documentation



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Drew Wetherell
Bourne Amenity Ltd
The Wharf
Newenden
Cranbrook
Kent TN18 5QG

18th October 2021
Our Ref: TOHA/21/7189/2/SS
Your Ref: PO 77955

Dear Sirs

Topsoil Analysis Report: Westerham TS6 Topsoil

We have completed the analysis of the soil sample recently received, referenced *Westerham TS6 Topsoil*, and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil*).

This report presents the results of analysis for the sample received, and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing or waste designation purposes, especially after the topsoil has left the Bourne Amenity site.

SAMPLE EXAMINATION

The sample was described as a brown (Munsell Colour 10YR 4/3), dry, friable, slightly calcareous LOAMY SAND with a single grain structure*. The sample was slightly stony and contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample. Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

Tim O'Hare Associates LLP
Howbery Park Wallingford Oxfordshire OX10 8BA
T:01491 822653 E:info@toha.co.uk
www.toha.co.uk

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- saturated hydraulic conductivity;
- pH and electrical conductivity values;
- calcium carbonate;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- visible contaminants (>2mm);
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water soluble sulphate;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

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

RESULTS OF ANALYSIS

Detailed Particle Size Analysis and Stone Content

The sample fell into the *loamy sand* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

Further detailed particle size analysis revealed the sample to have a sufficiently narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm), followed by *coarse sand* (0.50-1.0mm). This is usually ideal for topsoil in general landscape applications as reasonable porosity levels are generally maintained in a consolidated state and the risk of particle interpacking is reduced. The sample should therefore provide adequate drainage and aeration properties for general landscape applications.

The stone content of the sample was low and, as such, stones should not restrict the use of the soil for general landscape purposes.

Saturated Hydraulic Conductivity

The saturated hydraulic conductivity result (43mm/hr) recorded for the sample indicates that the material would demonstrate a moderately high drainage performance for a general landscape topsoil.

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.3). This pH value would be considered suitable for general landscape purposes provided species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderate, which indicates that soluble salts should not be present at levels that would be harmful to plants.

The electrical conductivity value by CaSO₄ extract (BS3882 requirement) fell below the maximum specified value (3300 µS/cm) given in BS3882:2015 – Table 1.

Organic Matter and Fertility Status

The sample was adequate to well supplied with organic matter and all major plant nutrients.

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

Potential Contaminants

With reference to *BS3882:2015 - Table 1*: Notes 3 and 4, there is a requirement to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with homegrown produce* land use in the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels (C4SLs) for Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

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

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS3882:2015 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil*).

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, slightly calcareous loamy sand with a single grain structure and low stone content. The sample contained sufficient reserves of organic matter and plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes (trees, shrubs and amenity grass), provided species with a wide pH tolerance or those known to prefer alkaline soils are selected and the physical condition of the soil is satisfactory. This topsoil may not be ideal for plant species that specifically demand moisture retentive topsoil, unless additional moisture inputs are provided, especially in dry periods.

The topsoil was also fully compliant with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil*).

RECOMMENDATIONS

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, resspreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

Further details on soil handling are provided in Annex A of *BS3882:2015*.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



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BSc MSc
Graduate Soil Scientist



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Senior Associate

For & on behalf of Tim O'Hare Associates LLP



TIM O'HARE ASSOCIATES
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Mr Drew Wetherell
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The Wharf
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18th October 2021
Our Ref: TOHA/21/7189/2/SS
Your Ref: PO 77955

Dear Sirs

Subsoil Analysis Report: Westerham Subsoil

We have completed the analysis of the soil sample recently submitted, referenced *Westerham Subsoil*, and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil (*BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil*), including analysis of potential contaminants.

This report presents the results of analysis for the sample submitted, and it should be considered 'indicative' of the subsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing, especially after the subsoil has left the Bourne Amenity Ltd site.

SAMPLE EXAMINATION

The sample was described as a strong brown (Munsell Colour 7.5YR 5/8), slightly moist, friable, non to slightly calcareous SAND with a single grain structure*. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample. Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

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ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- saturated hydraulic conductivity;
- pH and electrical conductivity values;
- calcium carbonate;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- visible contaminants (>2mm);
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cr(VI), Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water soluble sulphate;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

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

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *sand* texture class and would be described as light in texture. Further detailed particle size analysis revealed the sample to have a sufficiently narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm). This particle size distribution is usually considered suitable for subsoil materials in general landscape applications provided the soil's physical condition is maintained and compaction avoided.

The sample was virtually stone-free and, as such, stones should not restrict the use of the soil for use as subsoil in general landscape purposes.

Saturated Hydraulic Conductivity

The saturated hydraulic conductivity result (223 mm/hr) recorded for the sample is high for a *general landscape* subsoil and is likely to offer a free-draining subsoil environment.

pH and Electrical Conductivity Values

The sample was alkaline in reaction (pH 7.6). This pH value would be considered suitable as subsoil for general landscape purposes providing species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was very low, which indicates that soluble salts were not present at levels that would be harmful to plants.

Organic Matter Content

The organic matter content was low (<0.5%) and compliant with *BS8601:2013 – Table 1*.

Potential Contaminants

With reference to *BS8601:2013 – Section 4.2: Note 2*, there is a recommendation to confirm levels of potential contaminants in relation to the subsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations of selected potential contaminants that affect human health have been assessed for the concentrations that affect human health have been assessed for *residential* end-use against the Suitable For Use Levels (S4ULs) presented in the LQM/CIEH S4ULs for Human Health Risk Assessment (2015) and the 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 exceeded their respective guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS8601:2013 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the sample for use as subsoil in general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Subsoil (*BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil*), including analysis of potential contaminants.

From the soil examination and subsequent laboratory analysis, the sample was described as an alkaline, non-saline, non-calcareous virtually stone-free sand. The organic matter content was low and consistent with subsoil. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the soil represented by this sample would be considered suitable for use as subsoil for general landscape purposes provided its 'free-draining' nature is acceptable, species with a wide pH tolerance or those known to prefer alkaline soils are selected, and the soil's physical condition is satisfactory.

The sample was largely compliant with the requirements of the British Standard for Subsoil (*BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil*) with the exception of its overall particle size distribution, which fell outside of the specified textural range given for *BS3882:2015 – Figure 1*. On this occasion, these non-compliances are considered minor and insignificant when reviewed in the context of all the other results, provided its 'free-draining' nature is acceptable for the recipient scheme.

Soil Handling Recommendations

Reference should be made to Section 6.0 of *BS8601:2013* with regard to the handling and management of the subsoil:

"Soils generally lose strength and become less resistant to damage as they become wetter; therefore, it is essential that they are stripped, handled and trafficked only in the appropriate conditions of weather and soil moisture, and with suitable machinery. If sustained heavy rainfall (e.g. >10 mm in 24 h) occurs during soil stripping operations, work should be suspended and not restarted until the ground has had at least one dry day or until a suitable moisture content has been reached. A soil can be considered to have a suitable moisture content for stripping and handling if the whole thickness of the subsoil layer being stripped and/or handled is at a moisture content below the plastic limit as determined in accordance with BS 1377-2:1990 (incorporating Amendment No. 1).

Machinery should be selected and routed to minimise soil compaction."

Further guidance is provided in Clauses 6.1–6.5.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



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