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21st September 2022

Ref: A11057/220909/L1.1

Rafal Chodkowski
Berkley Homes (Oxford and Chiltern) Ltd
Berkley House
Farnham Lane
Farnham Royal
SL2 3RQ

By Email only: Rafal.Chodkowski@berkeleygroup.co.uk

Dear Rafal,

RE: Kenavon Drive, Reading - Validation of Clean Cover System within the M2 area

Please find attached Omnia Report A11057/220909/L1 detailing the results of the validation works undertaken within areas of soft landscaping within the M2 area of the above site, in support of Reading Borough Council planning application Ref. 170509.

If you have any questions, please do not hesitate to contact us.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Lauren Burnett".

Lauren Burnett
Geo-environmental Consultant

A handwritten signature in black ink, appearing to read "O. Maxwell".

Olivia Maxwell
Senior Geo-environmental Consultant

Attachments:

- Attachment 1: Limitations
- Attachment 2: Site Figures
- Attachment 3: Topsoil Supply Certificates
- Attachment 4: Photographs
- Attachment 5: Chemical Testing Results
- Attachment 6: Origin of GAC Values

VALIDATION REPORT

Site Address	Kenavon Drive, Reading, Berkshire RG1 3HS
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1.0 Objectives & Terms of Reference

The objective of this report is to provide a Tier 1 human health risk assessment of near-surface soil samples recovered from areas of soft landscaping within the M2 area of the above site. Phase M2 is presented in the site plan provided by the client, reference O.446.ARC.001, and is included as Figure 3.0 within Attachment 2. Validation will be undertaken through on-site observations and chemical testing of soil samples, as set out within the Omnia Phase 2 report (reference: A11057/2.0) and Remediation Method Statement (RMS) (reference: A11057/3.1).

A site location plan is included as Figure 1.0 within Attachment 2. The proposed site layout is included as Figure 2.0 in Attachment 2.

2.0 Background

At present the development at Kenavon Drive, Reading is ongoing with areas of soft landscaping within the area of M2 requiring validation. At the time of the site visit, the topsoil had been placed in all locations, however turf or planting had yet to be positioned in some areas (M2-HP101 and M2-HP102). Planting had been placed in location M2-HP103 and turf within location M2-HP104. Samples were taken from areas of soft landscaping and planters along the edges of the apartment building.

The area of landscaping in front of A36 and A37 had not been placed at the time of the site visit as scaffolding was present in the area. Photographs were provided by the client on 16th September 2022 to Omnia, which showed the finished planters in front of A36 and A37. These are included within Attachment 4 of this report.

The Phase 2 report (reference: A11057/2.0, dated March 2019) indicated the presence of elevated concentrations of asbestos, heavy metals (arsenic, beryllium, and lead), Polycyclic Aromatic Hydrocarbons (PAHs) and Total Petroleum Hydrocarbons (TPH) in near-surface soils across the site.

The subsequent RMS (reference: A11057/3.1) stipulated that impacted soils within all areas of proposed soft landscaping were excavated to a minimum depth of 300mm below finished ground level. Following removal, a clean cover system comprising 300mm of clean, chemically suitable soils should be emplaced and underlain by a marker layer in the form of a high-visibility geotextile membrane. Sampling frequency was at 1 per 1:150m³ with a minimum of 3no. per source.

One (1no.) site visit was undertaken on the 30th August 2022 by an Omnia representative. Four (4no.) hand dug pits were advanced to depths ranging from 0.31m bgl to 0.63m bgl with four (4no.) soil samples taken for chemical testing across areas M2.

2.1 Soil Capping System

The agreed RMS (A11057/3.1) stipulated that a clean cover system and high-visibility geotextile should be implemented within all areas of soft landscaping to act as a marker layer and to mitigate the risk from identified contaminants in the underlying soils and to render the pollution pathway inactive.

The RMS stipulated cover system thicknesses as described in Table 2.1 overleaf:

Table 2.1 - Cover System Details

Material	Minimum Depth (mm bgl)
Topsoil Growing Medium	300
High-Visibility Geotextile Marker	300
Tree Pits	900

3.0 Scope of works

3.1 Soil Capping System

The scope of works comprised the validation of all soft landscaped areas through the advancement of hand excavated pits to minimum depths of 300mm bgl at a frequency of 1 per 1:150m³ with a minimum of 3no. per source, to confirm the removal of impacted soils to the specified depth, placement of the high-visibility geotextile and to retrieve samples from the emplaced topsoil. These samples were submitted for laboratory analysis for assessment of their chemical suitability, as specified within Section 4.0 of the RMS (A11057/3.1).

4.0 Site Work and Observations – Soil Capping System

4.1 Site Visit 30/08/2022

The site visit was undertaken on the 30th August 2022 by a consultant from Omnia. At the time of the site visit topsoil had been placed in all areas within Area M2, and turf and planting had been placed within some areas.

During the site visit, four (4no.) hand-excavated pits (M2-HP101 – M2-HP104) were advanced to depths ranging from 0.31m bgl to 0.63m bgl. These were utilised to confirm the thickness of the topsoil and to confirm the presence of a high-visibility geotextile at the specified depth, as well as to collect topsoil samples. Of these, three (3no.) soil samples were scheduled for chemical laboratory analysis. Photographs of the areas of soft landscaping inspected during the first site visit are included within Attachment 4.

4.2 Ground Conditions Encountered

A total of four (4no.) hand-excavated pits were advanced to depths between 0.31m bgl to 0.63m bgl, as shown in Figure 3.0 in Attachment 2. The soil conditions encountered are detailed on the logs, presented as Attachment 2, and summarised below:

Topsoil

Topsoil was found within all four (4no.) exploratory hole locations and generally consisted of dark brown slightly silty fine to coarse SAND with frequent organic matter and rare subangular fine to medium GRAVEL of flint.

Topsoil was encountered from ground level to a maximum depth of 0.63m bgl.

The topsoil and geotextile depth for the areas of soft landscaping are summarised in Table 4.1 overleaf.

Table 4.1 - Measured Topsoil Thicknesses & Geotextile Membrane Depths

Visit Date	20/05/2022			
Validation Location	M2-HP101	M2-HP102	M2-HP103	M2-HP101
Topsoil Thickness (mm)	630	630	400	310
Geotextile Membrane Depth (mm bgl)	630	630	400	310
Validation Pass/Fail	<u>Pass</u>	<u>Pass</u>	<u>Pass</u>	<u>Pass</u>

As can be seen from Table 4.1 above, the thicknesses of topsoil placed, together with the depth of emplacement of the high-visibility geotextile meet or exceed the requirements set out within the RMS.

Supply certificates confirming the suitability of the material brought to site are included as Attachment 3.

A photographic record of the validation pits showing confirmation of the capping system thickness is presented as Attachment 4.

4.3 Laboratory Analysis

Soil samples collected were submitted for testing. These samples were submitted to Element Materials Technology under UKAS accreditation for analysis comprising:

- CLEA Metals;
- Banded Polycyclic Aromatic Hydrocarbons (PAHs);
- Banded Total Petroleum Hydrocarbons (TPH);
- Asbestos Fibres in Soil;
- Soluble Sulphate;
- pH;
- Phenols; and,
- Total Cyanide.

Laboratory results are presented as Attachment 5.

4.4 Tier 1 Human Health Risk Assessment

The analytical results have been directly compared to the validation criteria set out in Table 5.2 of the Omnia Remediation Method Statement (ref: A11057v3.1). This comparison is detailed within Table 4.2

overleaf for the three (3no.) samples tested (M2-HP101, M2-HP103, and M2-HP104). The origin of the Tier 1 screening values is presented as Attachment 6.

Table 4.2 - Summary of Inorganic & Hydrocarbon Toxicity Assessment for a Residential End Use with Home Grown Produce

Determinant	Units	GAC	n	MC	Location of Exceedance	Pathway	Assessment
Metals							
Arsenic	mg/kg	37	3	15.1	N/A	1	No Further Action
Beryllium	mg/kg	1.7	3	0.6	N/A	1	No Further Action
Cadmium	mg/kg	11	3	<0.1	N/A	2	No Further Action
Chromium (III)	mg/kg	910	3	82.5	N/A	1	No Further Action
Chromium (VI)	mg/kg	6	3	<0.3	N/A	2	No Further Action
Copper	mg/kg	2,400	3	23	N/A	2	No Further Action
Lead	mg/kg	200	3	23	N/A	1	No Further Action
Mercury	mg/kg	40	3	0.1	N/A	1	No Further Action
Nickel	mg/kg	180	3	15.5	N/A	1,2	No Further Action
Selenium	mg/kg	250	3	<1	N/A	1,2	No Further Action
Zinc	mg/kg	3,700	3	54	N/A	2	No Further Action
General Inorganics							
Asbestos	%	NAD	3	NAD	N/A	5	No Further Action
Total Cyanide *	mg/kg	50	3	0.7	N/A	1	No Further Action
Organics							
General Organics							
Phenol	mg/kg	280	3	0.26	N/A	2	No Further Action
PAH							
Naphthalene	mg/kg	2.3	3	<0.04	N/A	2	No Further Action
Acenaphthylene	mg/kg	170	3	<0.03	N/A	2	No Further Action
Acenaphthene	mg/kg	210	3	<0.05	N/A	2	No Further Action
Fluorene	mg/kg	170	3	<0.04	N/A	2	No Further Action
Phenanthrene	mg/kg	95	3	0.07	N/A	2	No Further Action
Anthracene	mg/kg	2,400	3	<0.04	N/A	2	No Further Action
Fluoranthene	mg/kg	280	3	0.11	N/A	1,2	No Further Action
Pyrene	mg/kg	620	3	0.09	N/A	1,2	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	3	<0.06	N/A	1	No Further Action
Chrysene	mg/kg	15	3	0.05	N/A	1	No Further Action
Benzo(b)Fluoranthene	mg/kg	2.6	3	<0.05	N/A	1	No Further Action
Benzo(k)Fluoranthene	mg/kg	77	3	<0.02	N/A	1	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	3	<0.04	N/A	1	No Further Action
Indeno(123-cd)Pyrene	mg/kg	27	3	<0.04	N/A	1	No Further Action
Dibenzo(ah)Anthracene	mg/kg	0.24	3	<0.04	N/A	1	No Further Action
Benzo(ghi)Perylene	mg/kg	320	3	<0.04	N/A	1	No Further Action
Banded TPH							
TPH EC 5-6**	mg/kg	42	3	0.2	N/A	4	No Further Action
TPH EC >6-8**	mg/kg	100	3	0.2	N/A	4	No Further Action
TPH EC >8-10**	mg/kg	27	3	<5	N/A	4	No Further Action
TPH EC> 10-12**	mg/kg	74	3	<10	N/A	2	No Further Action
TPH EC> 12-16**	mg/kg	140	3	36	N/A	2	No Further Action
TPH EC> 16-21**	mg/kg	260	3	27	N/A	1	No Further Action
TPH EC> 21-35**	mg/kg	1,100	3	378	N/A	1	No Further Action
TPH EC> 35-44**	mg/kg	1,100	3	23	N/A	1	No Further Action

Notes

Main Exposure Pathways: 1 = Ingestion of Soil & Indoor Dust, 2 = Consumption of Homegrown Produce & Attached Soil; 3 = Dermal Contact (Indoor & Outdoor); 4 = Inhalation of Vapour (Indoor & Outdoor); 5 = Inhalation of Dust (Indoor & Outdoor), 6 = Inhalation of Fibres.

Notes (continued)

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration

* Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.

** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. OEC has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.

Laboratory results were also compared to the BS3882:2015 phytotoxic screening criteria and are summarised in Table 4.3 below.

Table 4.3 – BS3882:2015 Chemical Suitability Criteria for Potentially Phytotoxic Elements

Determinant	Units	pH >7.0	No	MC	Assessment
Copper	mg/kg	<300	3	23	No Further Action
Nickel	mg/kg	<200	3	15.5	No Further Action
Zinc	mg/kg	<110	3	54	No Further Action

With reference to Tables 4.2 and 4.3, it can be seen that all recorded concentrations comply with the adopted screening level for the protection of Human Health and the phytotoxic suitability criteria. The laboratory results are presented within Attachment 5 with the origin of the Tier 1 screening values presented in Attachment 6.

4.5 Discussion

Laboratory testing of soil samples collected from emplaced soils within areas of soft landscaping (M2-HP101, M2-HP103 and M2-HP104) did not show any exceedances of the assessment criteria set out within the agreed RMS (A11057/3.1). The topsoil is therefore considered to be suitable for use as a clean capping system within areas of communal soft landscaping.

The validation in areas of soft landscaping undertaken by Omnia, as shown in Table 4.1, confirms that the thickness of the installed clean cover system complies with Section 4.0 of the agreed RMS (A11057/3.1).

5.0 Conclusion

Based on the findings of this topsoil validation, which consisted of verifying topsoil thickness, the presence of, and depth to, a geotextile membrane, and chemical testing of soil samples; the topsoil present within the M2 area conforms to the specifications established within Section 4.0 of the agreed RMS (A11057/3.1).

It is therefore considered that areas of soft landscaping do not have the potential to present a significant risk to human health and comply with the specifications established within the RMS, and that the areas are suitable for the proposed end use.

END OF REPORT

Attachment 1

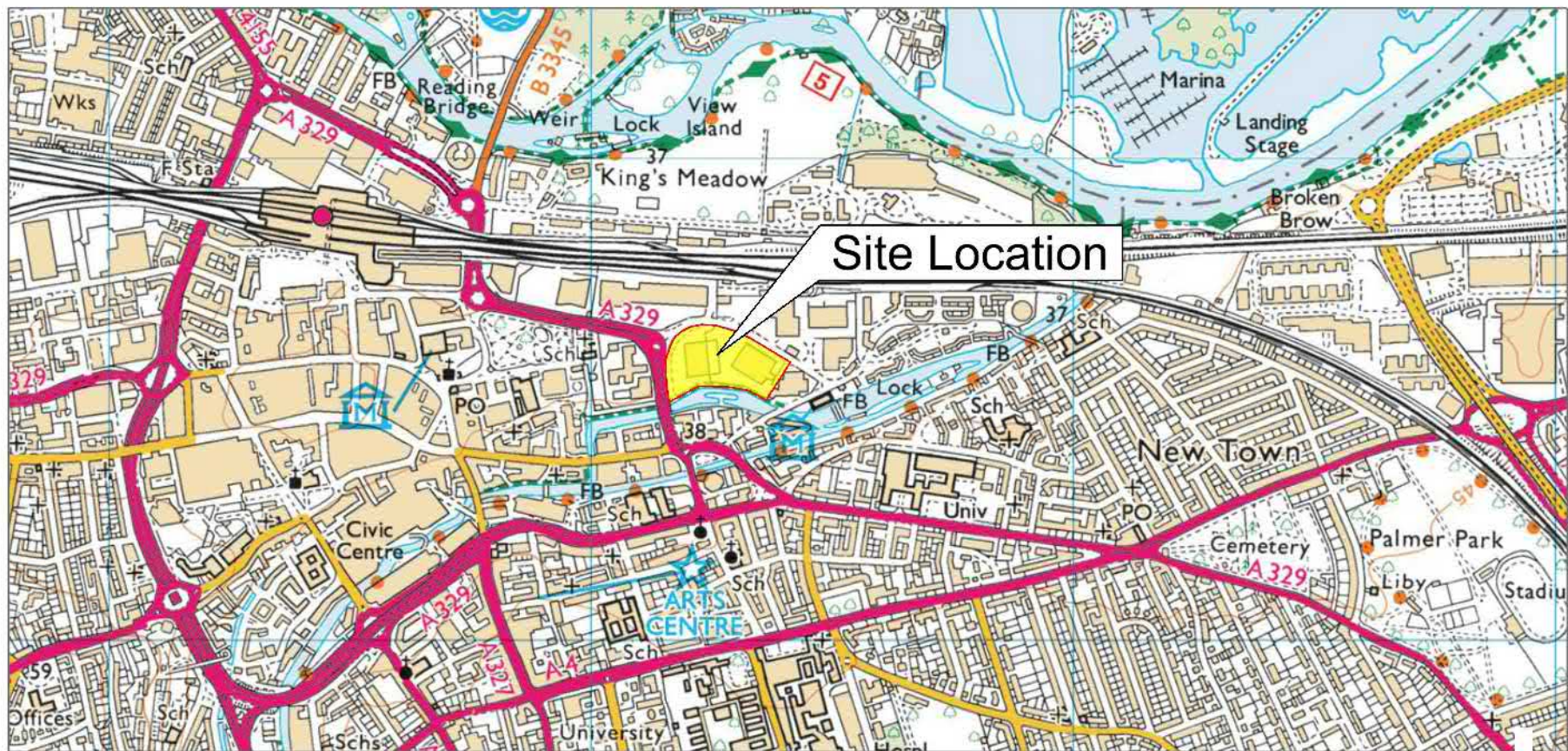
Limitations

-
1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between OE Ltd and the Client as indicated in Section 1.2.
 2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
 3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination, which are enforced, by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
 4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
 5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
 6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
 7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
 8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
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 10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.
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Attachment 2

Figures

Key



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Job Title:

Kenavon Drive, Reading

Client:

Berkeley Homes (Western) Ltd

Project No:

A11057

Date:

06/03/2019

Drawn By:

G.Larcombe

Authorised By:

T.Mitchell

Scale:

1 Square = 1Km

Notes:

Drawing Title:

Figure 1.0 - Site Location Plan

Key



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This contractor is responsible for checking dimensions, tolerances and references. Any discrepancy to be notified with the Architect before proceeding with the works. Where, as then is caused by drawings to affect under the legal use, drawing it to be avoided.

Do not scale drawing. E.g. given dimensions to be taken in at all times.

SDN REGULATIONS 2010. All current drawings and specifications for the project must be read in conjunction with the Designer's Manual and Government Framework Project.

All intellectual property rights reserved.

References

1. Entrance Steps and kerb redesigned. Also relocated cycle stands, two relocated parking bays. Door opening inwards.
2. Access amended in response for refuse vehicle loading.
3. Riverside ramp to replace proposed steps.

Year	Date	Description	Debit	Credit
2011	01/01	Opening Balance		100.00
2011	01/01	Opening Balance	100.00	

Kenavon Drive Landscape

Illustrative Landscape Masterplan

AL6086-2010 REV A
Planning Addendum

Issue 852 Created: 02 Date: Feb 2017 Issue 852 #1

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London
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Job Title:

Kenavon Drive, Reading

Client:

Berkeley Homes (Western) Ltd

Project No:

A11057

Drawn By:

G.Larcombe

Scale:

NTS

Date:

06/03/2019

Authorised By:	
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T.Mitchell

Notes:

Drawing Title:

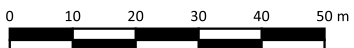
Figure 2.0 - Proposed Development Plan

Key



Approximate Boundary of Area M2

■ Validation Locations



Scale
1:1,200

Paper Size
A4

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Job Title:
Kenavon Drive, Reading

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Berkley Homes

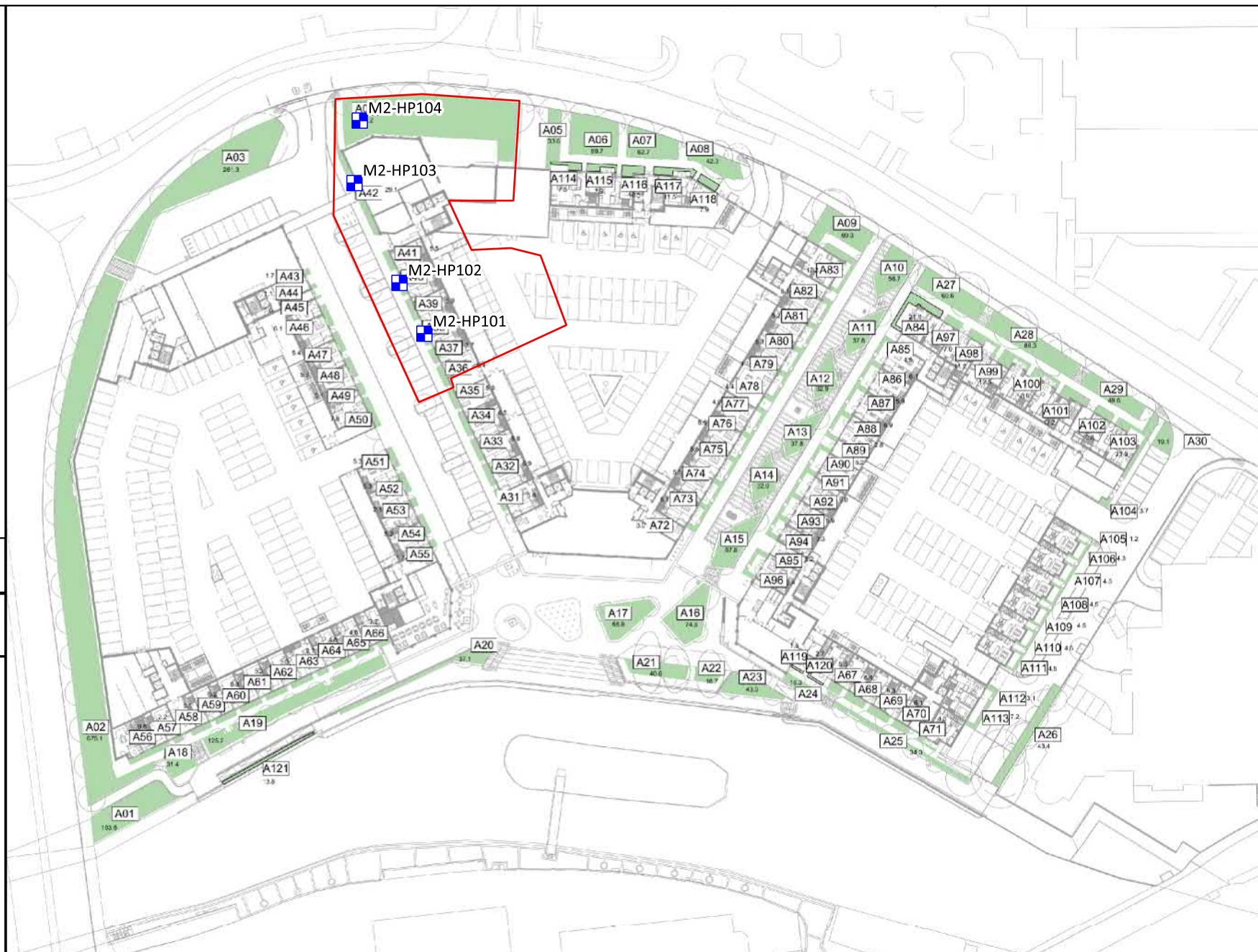
Project Number:
A11057

Drawn By:
L. Burnett

Date:
09/09/2022

Authorised By:
O. Maxwell

Drawing Title:
Figure 3.0
Intrusive Location Plan
(Area M2)



Attachment 3

Topsoil Import Tickets and Topsoil Certificates



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

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

21st April 2022
Our Ref: TOHA/22/7449/SS/Rev.01
Your Ref: PO 103169

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 dark brown (Munsell Colour 10YR 3/3), slightly moist, friable, non-calcareous LOAMY SAND with a weakly developed, fine granular structure*. The sample was virtually stone-free 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 found the sample to have a sufficiently narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm) and *coarse sand* (0.50-1.0mm). This is acceptable for topsoil in general landscape applications as reasonable porosity levels are usually maintained in a consolidated state and the risk of particle interpacking is minimised. The topsoil represented by this sample could be described as 'free-draining'.

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 (30 mm/hr) recorded for the sample indicates that the material would demonstrate sufficient drainage performance for a general landscape topsoil.

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.7), with a pH value that exceeded the maximum specified value for Multipurpose Topsoil given in BS3882:2015 – Table 1 (pH 8.5). The calcium carbonate (lime) content result indicates that the sample was non-calcareous (lime-free). As such, the source of the alkalinity in this instance is likely to be the very low buffering capacity of the high sand content material and influence of potassium ions in the organic component of the topsoil blend. As such, 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 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, non-calcareous loamy sand with a weakly developed 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 during prolonged period of dry weather.

The organic matter content of the topsoil would probably be considered acceptable for lower foot traffic amenity grass areas (e.g. road verges). However, the high organic matter content of the topsoil may lead to variable settlement and a soft, uneven surface if used for higher performance amenity grass establishment, e.g. sports pitches or formal lawns.

The topsoil was largely compliant with the requirements of the British Standard for Topsoil (BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil), with the exception of the pH value that slightly exceeds the maximum specified value. On this occasion, this non-compliance would be considered minor when reviewed in the context of the full results (particularly calcium carbonate) and proposed end-use of this 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



Ceri Spears
BSc MSc MSoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP



Westerham TS6
Topsoil

8
4
4
13
41
21
9
88
LS
2
1
0

0
0

30

8.7
<1.0
1048
3092
5.2
12.6
0.68
11
46
1261
100

3
11
21
0.48
< 0.2
12
< 4.0
12
11
< 0.3
13
< 1.0
32
37
2.6
< 1.0
< 1.0
8.2
< 1.0
0.049

[illegible]

< 0.001
< 0.001
< 0.001
< 1.0
< 2.0
< 8.0
< 8.0
< 10
< 0.001
< 0.001
< 0.001
< 1.0
< 2.0
< 10
< 10
< 10

< 0.001
< 0.001
< 0.001
< 0.001
< 0.001
< 0.001

Not-detected

Visual Examination

C. asperna

Ceri Spears
BSc MSc MISOilSci
Senior Associate

The contents of this certificate shall not be reproduced without the express written permission of Tim O'Hare Associates LLP.

Attachment 4

Photographs



M2-HP101
Membrane Check and Depth Check
PASS



M2-HP102
Membrane Check and Depth Check
PASS



M2-HP103
Membrane Check and Depth Check
PASS



M2-HP104
Membrane Check and Depth Check
PASS

 15 Sep 2022 at 16:58:2 11 Palmer Street Reading England RG1 United Kingdom	 16 Sep 2022 at 12:55:59 15 Palmer Street Reading England RG1 United Kingdom
Client provided photo showing planter in front of A36 and A37	M Client provided photo showing planter in front of A36 and A37
 16 Sep 2022 at 12:55:26 15 Palmer Street Reading England RG1 United Kingdom	
Client provided photo showing planter in front of A36 and A37	

Attachment 5
Chemical Testing Results

Omnia
3-6 The Quarterdeck
Port Solent
Portsmouth
PO6 4TP



Attention : Olivia Maxwell
Date : 6th September, 2022
Your reference : A11057
Our reference : Test Report 22/14139 Batch 1
Location : Kenavon Drive M2
Date samples received : 1st September, 2022
Status : Final Report
Issue : 1

Four samples were received for analysis on 1st September, 2022 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Bruce Leslie
Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Omnia
Reference: A11057
Location: Kenavon Drive M2
Contact: Olivia Maxwell
EMT Job No: 22/14139

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	7-9	10-12								Please see attached notes for all abbreviations and acronyms		
Sample ID	M2-HP101	M2-HP103	M2-HP104										
Depth	0.00-0.63	0.00-0.40	0.00-0.31										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	30/08/2022	30/08/2022	30/08/2022										
Sample Type	Soil	Soil	Soil										
Batch Number	1	1	1										
Date of Receipt	01/09/2022	01/09/2022	01/09/2022								LOD/LOR	Units	Method No.
Arsenic #	9.4	15.1	8.9								<0.5	mg/kg	TM30/PM15
Barium #	35	33	31								<1	mg/kg	TM30/PM15
Beryllium	0.6	0.6	0.6								<0.5	mg/kg	TM30/PM15
Cadmium #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM30/PM15
Chromium #	48.2	82.5	59.9								<0.5	mg/kg	TM30/PM15
Copper #	11	23	17								<1	mg/kg	TM30/PM15
Lead #	20	23	20								<5	mg/kg	TM30/PM15
Mercury #	0.1	0.1	0.1								<0.1	mg/kg	TM30/PM15
Nickel #	14.4	15.5	13.6								<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1								<1	mg/kg	TM30/PM15
Vanadium	39	38	32								<1	mg/kg	TM30/PM15
Water Soluble Boron #	2.1	2.7	2.4								<0.1	mg/kg	TM74/PM32
Zinc #	49	54	53								<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05								<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.07	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.11	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Pyrene #	0.09	<0.03	<0.03								<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06								<0.06	mg/kg	TM4/PM8
Chrysene #	0.05	<0.02	<0.02								<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07								<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	<0.6	<0.6								<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05								<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02								<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	91	92	92								<0	%	TM4/PM8
EPH >C8-C10 (EH_1D_Total) #	<5	<5	<5								<5	mg/kg	TM5/PM8
EPH >C10-C12 (EH_1D_Total) #	<10	<10	<10								<10	mg/kg	TM5/PM8
EPH >C12-C16 (EH_1D_Total) #	36	<10	<10								<10	mg/kg	TM5/PM8
EPH >C16-C21 (EH_1D_Total) #	<10	25	27								<10	mg/kg	TM5/PM8
EPH >C21-C35 (EH_1D_Total) #	378	270	208								<10	mg/kg	TM5/PM8
EPH >C35-C44 (EH_1D_Total)	23	20	<10								<10	mg/kg	TM5/PM8
EPH >C8-C44 (EH_1D_Total)	437	315	235								<30	mg/kg	TM5/PM8
GRO (>C4-C6)	<0.1	0.2	<0.1								<0.1	mg/kg	TM36/PM12

Client Name: Omnia
Reference: A11057
Location: Kenavon Drive M2
Contact: Olivia Maxwell
EMT Job No: 22/14139

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	7-9	10-12								Please see attached notes for all abbreviations and acronyms		
Sample ID	M2-HP101	M2-HP103	M2-HP104										
Depth	0.00-0.63	0.00-0.40	0.00-0.31										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	30/08/2022	30/08/2022	30/08/2022										
Sample Type	Soil	Soil	Soil										
Batch Number	1	1	1										
Date of Receipt	01/09/2022	01/09/2022	01/09/2022								LOD/LOR	Units	Method No.
GRO (>C6-C8) (HS_1D_Total) #	<0.1	0.2	<0.1								<0.1	mg/kg	TM36/PM12
GRO (>C4-C8)	<0.1	0.4	<0.1								<0.1	mg/kg	TM36/PM12
Total Phenols HPLC	0.26	<0.15	<0.15								<0.15	mg/kg	TM26/PM21
Natural Moisture Content	13.5	30.6	21.9								<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3								<0.3	mg/kg	TM38/PM2
Sulphate as SO4 (2:1 Ext) #	0.0481	0.0872	0.0222								<0.0015	g/l	TM38/PM2
Chromium III	48.2	82.5	59.9								<0.5	mg/kg	NONE/NONE
Total Cyanide #	0.6	0.7	<0.5								<0.5	mg/kg	TM89/PM4
pH #	7.68	8.20	8.33								<0.01	pH units	TM73/PM1

Client Name: Omnia
Reference: A11057
Location: Kenavon Drive M2
Contact: Olivia Maxwell

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

[illegible]

Client Name: Omnia
Reference: A11057
Location: Kenavon Drive M2
Contact: Olivia Maxwell

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/14139

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

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	EU_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.

EMT Job No: 22/14139

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

EMT Job No: 22/14139

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes

Attachment 6
Origin of GAC Values

Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
Metals				
Arsenic	mg/kg	37	1	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Arsenic
Beryllium	mg/kg	1.7	1	LQM CIEH Suitable for Use Levels (S4UL) 2015
Boron	mg/kg	290	1	
Cadmium	mg/kg	11	2	
Chromium (III)	mg/kg	910	1	
Chromium (VI)	mg/kg	6	2	
Copper	mg/kg	2,400	2	
Lead	mg/kg	200	1	Category 4 Screening Level (C4SL) utilising exposure parameters from CLEA SR3 report.
Mercury	mg/kg	40	1	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Mercury
Nickel	mg/kg	180	1,2	LQM CIEH Suitable for Use Levels (S4UL) 2015
Selenium	mg/kg	250	1,2	
Vanadium	mg/kg	410	2	
Zinc	mg/kg	3,700	2	
General Inorganics				
Total Cyanide*	mg/kg	50	1	Dutch Intervention Values 2010
Asbestos	%	0.001%	6	OEC Derived Value based on ICRL
General Organics				
Phenol	mg/kg	280	2	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
PAHs				
Naphthalene	mg/kg	2.3	2	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Acenaphthylene	mg/kg	170	2	
Acenaphthene	mg/kg	210	2	
Fluorene	mg/kg	170	2	
Phenanthrene	mg/kg	95	2	
Anthracene	mg/kg	2,400	2	
Fluoranthene	mg/kg	280	1,2	
Pyrene	mg/kg	620	1,2	
Benzo(a)Anthracene ^l	mg/kg	7.2	1	
Chrysene	mg/kg	15	1	
Benzo(b)Fluoranthene	mg/kg	2.6	1	
Benzo(k)Fluoranthene	mg/kg	77	1	
Benzo(a)Pyrene	mg/kg	2.2	1	
Indeno(123-cd)Pyrene	mg/kg	27	1	
Dibenzo(a,h)Anthracene	mg/kg	0.24	1	

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Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
Benzo(ghi)Perylene	mg/kg	320	1	
BTEX & MTBE				
Benzene	mg/kg	0.087	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
Toluene	mg/kg	130	2,4	
Ethylbenzene	mg/kg	47	2,4	
Xylenes	mg/kg	56	2,4	LQM CIEH Suitable for Use Levels (S4UL) 2015 1% SOM o-Xylene
MTBE	mg/kg	49	4	Soil Generic Assessment Criteria for Human Health Risk Assessment (2010)
TPH-CWG				
Aliphatic				
Aliphatic EC 5-6	mg/kg	42	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Aliphatic EC >6-8	mg/kg	100	4	
Aliphatic EC >8-10	mg/kg	27	4	
Aliphatic EC >10-12	mg/kg	130 ^(vap)	4	
Aliphatic EC > 12-16	mg/kg	1,100 ^(sol)	4	
Aliphatic EC > 16-35	mg/kg	65,000 ^(sol)	1	
Aliphatic EC >35-44	mg/kg	65,000 ^(sol)	1	
Aromatic				
Aromatic EC 5-7	mg/kg	70	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Aromatic EC>7-8	mg/kg	130	4	
Aromatic EC> 8-10	mg/kg	34	4	
Aromatic EC> 10-12	mg/kg	74	2	
Aromatic EC> 12-16	mg/kg	140	2	
Aromatic EC> 16-21	mg/kg	260	2	
Aromatic EC> 21-35	mg/kg	1,100	1	
Aromatic EC> 35-44	mg/kg	1,100	1	
Banded TPH				
TPH EC 5-6**	mg/kg	42	4	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM, utilising the most conservative of the Ali/Aro chain lengths.
TPH EC >6-8**	mg/kg	100	4	
TPH EC >8-10**	mg/kg	27	4	
TPH EC> 10-12**	mg/kg	74	2	
TPH EC> 12-16**	mg/kg	140	2	
TPH EC> 16-21**	mg/kg	260	1	
TPH EC> 21-35**	mg/kg	1,100	1	

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	DOC REF	DOCUMENT NAME
	TECH11101	Residential End Use with Homegrown Produce

Determinant	Unit	GAC	Exposure Pathway	Origin of Risk Assessment Value
TPH EC> 35-44**	mg/kg	1,100	1	

Notes

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance.

Main Exposure Pathways: 1 = Ingestion of Soil & Indoor Dust, 2 = Consumption of Homegrown Produce & Attached Soil; 3 = Dermal Contact (Indoor & Outdoor); 4 = Inhalation of Vapour (Indoor & Outdoor); 5 = Inhalation of Dust (Indoor & Outdoor), 6 = Inhalation of Fibres

* Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.

** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. OEC has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.

(sol) – GAC presented exceeds the solubility saturation limit.

(vap) – GAC presented exceeds the vapour saturation limit.

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