OAKSHIRE
ENVIRONMENTAL

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Phase 4 Verification Report

21 November 2024

Mr Warren
Builders Yard, Rear of 24 Elton Road, Wansford, PE8 6JD

Report by Mr Louis Turner BSc (Hons)
Supervised by Mr Joseph Turner

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1. Introduction

The following document is a Phase 4 Verification Report carried out by Oakshire Environmental, and includes details of the site, previous investigations, remediation, verification, an evaluation of risk and an assessment of further investigations.

1.1 Project Overview

The client's proposed project involves a change of use to dwellinghouse and associated work at Builders Yard, Rear of 24 Elton Road, Wansford, PE8 6JD. Following the implementation of remediation at the site, verification has been recommended. Oakshire Environmental have carried out a Phase 4 Verification Report, as described below.

1.2 Purpose of Investigation

The objectives of the Phase 4 Verification Report were to:

- Establish the context and setting of development at the site.
- Identify and assess the nature and extent of residual contamination risk.
- Determine the efficacy of remediation work carried out at the site.
- Assess the requirement for further investigations, remediation or mitigation measures.

1.3 Scope of Work

- In order to identify the nature and extent of contamination, 3 x soil samples will be taken from remediated areas and analysed for Metals (As,Cd,Cr,Cu,Pb,Hg,Ni,Se,Zn), Chromium (III & VI), PAH (USEPA 16), pH, Organic Matter and Asbestos (Qualitative) in a UKAS accredited laboratory.
- Results of laboratory testing will be assessed with reference to suitable screening values, including LQM/CIEH Suitable 4 Use Levels (S4ULs), CL:AIRE Category 4 Screening Levels (C4SLs) and Generic Assessment Criteria (GAC).
- To determine the efficacy of remediation, desk studies will be carried out to analyse photographic, evidence, certificates and supporting documentation collated during remediation at the site.
- This information will be used to update the Conceptual Site Model, produced as part of previous investigations to categorise the severity of consequence and probability of identified contaminant linkages, and conduct an evaluation of contamination risk to assess the requirement for further investigations, remediation or mitigation measures.
- Supporting appendix to include photographs, maps and plans of the site.

1.4 Limitations

Quantum Intelligent Trading Ltd is previously and hereafter referred to as "Oakshire Environmental" or "the company". Oakshire Environmental has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant when undertaking works of this nature. This report is only valid when used in its entirety and any information or advice contained within the report should not be relied upon until considered in the context of the whole report. Oakshire Environmental disclaims any responsibility to the client, as named on the front of this report ("the client"), and others in respect of any matters outside the scope of this work. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate. This report has been prepared solely for the benefit of the client and any other party using or placing reliance upon any information contained in this report does so at their own risk. Oakshire Environmental accepts no responsibility or liability for the contents of this report being used for any purpose or project for which it was not commissioned. Oakshire Environmental accepts no liability whatsoever for any loss or damage arising from the interpretation or use of this report and in no event shall the company be liable for any punitive, exemplary or other special damages, or for any indirect, incidental or consequential damages, including with respect to the performance or non-performance of any services, whether arising under breach of contract, tort or any other legal theory, and regardless of whether the company has been advised of, knew of, or should have known of the possibility of such damages. Furthermore, Oakshire Environmental does not accept any liability for the consequences of any legislative changes or the release of subsequent guidance documentation and following delivery of the report has no obligation to advise the client or any other party of such changes or their repercussions.

This report excludes consideration of potential hazards arising from any activities at the site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities. Oakshire Environmental does not warrant or guarantee that the site is free of hazardous or potentially hazardous materials or conditions. It should be noted that this report has been produced for environmental purposes only.

Oakshire Environmental cannot be held responsible for incorrect analysis of samples. The information and conclusions provided in this report are limited to, and representative of, the samples taken and cannot be extended to apply to the whole site, in addition, Oakshire Environmental cannot guarantee the accuracy of analysis for samples not taken at the source by the company or those which deviate due to exceedance of holding time or inappropriate sampling practises. The findings and/or recommendations of this report do not take into account any conditions that may be present but have hitherto not been encountered and as such further investigation and/or a reconsideration of the findings of this report should be undertaken if such conditions are subsequently encountered or an alternative development plan or land use is subsequently proposed.

2. Site

The following section provides a description of the site and location, proposed project and previous investigations, utilising information obtained from the client and publicly available sources.

2.1 Site Description and Location

The site is located on Elton Road in Wansford and is approximately 0.2ha. The site is comprised of a grass field, with a commercial building at the north west, two barns at the south and a gravel access track at the south east. The smaller of the two barns is wooden with a metal sheet roof, while the larger barn is metal and asbestos clad with a corrugated asbestos roof. The smaller barn is empty and the larger barn is currently used for storing chopped wood.

The site is bordered by residential dwellings and gardens to the north, east and south east, dense vegetation and another grass field to the south, with the grass field on the site extending to the west before reaching the River Nene. The surrounding area is predominantly residential with some commercial premises. 'Wansford Roman site' is situated 40m south east and 'Wansford Bridge' is 190m north, these are both scheduled monuments.

National Grid Reference: TL 07573 98890

2.2 Proposed Development

The proposed development involves the conversion of the existing commercial building to a dwelling. Associated work also includes the development of a gravel driveway from the south east leading towards the dwelling and the grass field will become the garden. The existing barns will be retained.

2.3 Previous Investigations

A Phase 1 Preliminary Risk Assessment was carried out by Oakshire Environmental in July 2022. This assessment considered there to be a low to moderate risk to human health, due to the site's former use as a builder's yard. It was considered likely that the use of vehicles and machinery and spillages and leakages of fuels and chemicals would have impacted shallow soils, given the absence of hardstanding. The potential presence of asbestos was also noted due to the poor condition of the existing barn buildings. There was also considered to be a risk from radon gas and basic protection measures were recommended in the proposed dwelling. The assessment recommended that a Phase 2 Intrusive Site Investigation should be undertaken, including sampling of shallow soil at the site to be tested for a suite of contaminants including heavy metals, hydrocarbons and asbestos.

Based on the findings of the Phase 1 Preliminary Risk Assessment, Oakshire Environmental carried out a Phase 2 Intrusive Site Investigation including sampling of made ground and shallow soil across the site. This assessment identified made ground at the east of the site including glass, brick, and concrete fragments while natural soil at the site had a sandy loam texture. Made ground was identified to a depth of 0.4m in one location and it is possible that deeper made ground is present where trial pits were not excavated further.

Arsenic and Beryllium contamination was identified in natural soil at the south of the site at a depth of 0.3m and Lead contamination was identified in made ground at the east and north. Elevated Iron concentrations were also identified across the site and Loose fibres of Chrysotile asbestos were identified in one sample at the east. There was considered to be a low to moderate risk to residential end users as there are multiple pathways that will exist given that these areas will be soft landscaping. There was considered to be a moderate risk to residential end users from asbestos contamination, however, it was noted that this appears to be highly localised. The risk to controlled waters and adjoining land was considered to be low as a result of the low vulnerability of underlying groundwater and the impermeable underlying geology. It was noted, however, that contaminants have the potential to runoff into nearby surface water and adjoining land.

The site also lies within a Radon Affected Area where it is estimated that between 5% and 10% of homes are likely to be above the Radon Action Level of 200 Becquerels per cubic metre. As a result, the building design will need to provide basic Radon protection in order to protect the health of future residents.

The Phase 2 Intrusive Site Investigation, therefore, concluded that remediation is necessary and further investigation should be carried out in the form of a Phase 3 Remediation Options Appraisal. As per the recommendations of the Phase 2 Intrusive Site Investigation, Oakshire Environmental carried out a Phase 3 Remediation Options Appraisal & Strategy, which recommended remediation through the removal of soil and placement of a cover system, in addition, to gas mitigation measures.

3. Remediation

3.1 Remediation Strategy

Soil and made ground from all proposed areas of soft landscaping should be excavated and disposed of off-site. There is no minimum requirement for excavations provided that they allow for the placement of the required thickness of clean cover. Sampled soil from the site is classified as Non-Hazardous, with asbestos containing soils classified as Hazardous, and should be disposed of accordingly, however, Waste Acceptance Criteria (WAC) testing may also be required for materials that are to be disposed of to landfill. Excavations should be carried out by a suitability qualified groundworks contractor and a photographic record of the excavation works should be kept, including the base and faces of each excavation.

A hi-vis geotextile membrane should be placed across all areas of proposed soft landscaping and folded up at the edges and a cover layer of clean imported material should then be placed directly onto the membrane to a minimum depth of 0.15m. It is important that cover soil is appropriately quarantined prior to placement or placed in its intended area straight away to ensure that cross-contamination does not occur.

Imported soil to be utilised as soft landscaping cover material must be shown to be uncontaminated and compliant with British Standard 3882:2015. Photographic evidence of the depth of cover is required to verify that the required depth of cover has been implemented.

In addition, in order to address the radon gas risk to the proposed dwelling, a sump was recommended.

3.2 Remediation Implementation

Information and supporting evidence supplied by the client show that a geotextile hi-vis membrane has been installed in all soft landscaping areas and soil has then been imported to the site and installed in these soft landscaped areas to a depth of 0.20m. All other areas have been covered by hardstanding,

Following consultation with Huntingdonshire District Council, an alternative gas mitigation measure was implemented, including installation of a radon protection membrane within the proposed dwelling floor.

4. Verification

The following section includes a review of documents and supporting evidence collected during remediation implementation, in addition to, an evaluation of sampling methodology.

4.1 Document Review & Evidence

Remediation work was not supervised by Oakshire Environmental, however, analytical reports, regulatory documentation and photographic evidence has been supplied by the client.

Photos showing the geotextile hi-vis membrane and imported cover soil installed to a depth of 0.20m in proposed soft landscaped areas are shown in Appendix. In addition, a site visit carried out by Oakshire Environmental, showed the site will be covered by hardstanding in all other areas.

Testing carried out by Tim O'Hare Associates on a composite sample of the imported British Sugar topsoil, supplied by Rose Group, showed it to be an alkaline, non-saline, slightly calcareous sandy loam with a weakly developed structure and was adequate organic matter and nutrient levels and no significant contamination. It was concluded that the soil would adhere to the BS3882 specification for 'multipurpose grade' and be well suited to general landscaping purposes. Results of topsoil analysis are provided following the Appendix.

Additional sampling was carried out on imported topsoil in-situ, to ensure the site is now uncontaminated and suitable for residential use. Sampling work and laboratory testing carried out is detailed below.

The developer has confirmed that a Rhinoplast Ultra Radon Barrier was installed within the proposed dwelling. Rhinoplast Ultra Radon Barrier is a monolithic LDPE barrier designed primarily for use with Radon gas and is fully Radon Gas tested and approved by NSAI (IAB) and meets the requirements of BRE211. Photos showing the installation of the membrane are shown in the appendix, in addition to, a copy of the 3C Shared Services Local Authority Building Control completion certification, confirming compliance with the Building Regulations as stated in Regulation 17.

4.2 Sampling Work

Trial holes were excavated to the geotextile membrane below the installed topsoil at locations shown on the plans in the appendix. Soil conditions were noted through the process to inform recommendations and conclusions.

Soil samples were then collected and placed into sample containers for laboratory analysis. Samples collected for VOC analysis were filled as much as possible to minimise air spaces, as volatile compounds can be lost into these spaces. Sampling equipment was then wiped clean to minimise cross contamination.

4.3 Health & Safety

When collecting soil samples on a potentially contaminated site it must be assumed that the soil is contaminated in order to protect the health of the assessor. Protective rubber gloves were worn at all times as well as substantial footwear. Equipment was washed thoroughly before and after use and kept in a container when transported to avoid the spread of any possible contamination. Sample containers were packed with biodegradable fill for protection and placed in a sealed plastic container for transportation to the laboratory.

5. Evaluation of Results

5.1 Screening Values

Results of laboratory testing of soil samples were analysed by comparing them to industry standard screening levels used for risk assessments. Screening levels used include the DEFRA Category 4 Screening Levels (C4SLs) based on Low Level of Toxicological Risk and the LQM/CIEH S4ULs for Human Health Risk Assessment. These levels cover multiple Soil Organic Matter (SOM) contents (1%, 2% and 6%) and assume a pH of 8. The 'residential with plant uptake' screening values were used to assess results. This land use considers direct soil and indoor dust ingestion and inhalation, skin contact with soils and dust, inhalation of vapours and ingestion of homegrown produce as exposure pathways. These levels take a conservative approach to assessing potential risk and concentrations below these screening values can be considered to represent 'uncontaminated conditions' which pose 'LOW' risk to human health based on the proposed land use.

It is important to note that exceedance of a relevant screening value does not necessarily constitute evidence of either a 'significant possibility of significant harm' or the need for remediation under the UK's planning regimes. Rather such exceedance should usually trigger a further detailed quantitative risk assessment, where site-specific parameters are used to derive site-specific assessment criteria. Common sense tells us, and a robust risk evaluation reveals, that a gross exceedance is a good indicator that an unacceptable risk is present.

5.2 Summary of Results

- Heavy metal concentrations were low and were below residential with plant uptake land use screening values in all samples
- pH was alkaline in all samples
- Total Organic Carbon value was moderate in all samples, suggesting the soil has a moderate organic matter content
- Polycyclic Aromatic Hydrocarbons (PAHs) concentrations were low and were below residential with plant uptake land use screening values in all samples

5.3 Risk Assessment Methodology

The potential level of risk posed by a particular source is determined by assessing the potential severity of the impact of the contaminant linkage on the receptor, if it is assumed to be present, and the probability of the contaminant linkage being present.

Severities are categorised from Minor to Severe and probabilities are categorised from Unlikely to High Likelihood to give a potential level of risk output.

Table 1: Risk Matrix

Probability	Severity of Consequence			
	Severe	Medium	Mild	Minor
High Likelihood	Very High Risk	High Risk	Moderate Risk	Low / Moderate Risk
Likely	High Risk	Moderate Risk	Low / Moderate Risk	Low Risk
Low Likelihood	Moderate Risk	Low / Moderate Risk	Low Risk	Very Low Risk
Unlikely	Low / Moderate Risk	Low Risk	Very Low Risk	Very Low Risk

Very High Risk

There is a high probability that severe harm could arise to a designated receptor from an identified source; or there is evidence that severe harm to a designated receptor is currently happening.

High Risk

Harm is likely to arise to a designated receptor from an identified source.

Moderate Risk

It is possible that harm could arise to a designated receptor from an identified source. It is relatively unlikely that any such harm would be severe or if any harm were to occur it is more likely that the harm would be relatively mild.

Low Risk

It is possible that harm could arise to a designated receptor from an identified source, however, it is likely that this harm, if realised, would normally be mild.

Very Low Risk

There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

5.4 Conceptual Site Model

The information in this section has been compiled to produce an initial conceptual site model outlining the potential sources, pathways and receptors to consider at the site. The level of risk was categorised by considering the severity and probability, as outlined in the previous section.

Table 2: Conceptual site model

Sources	Pathways	Receptors	Severity	Probability	Potential Level of Risk	
Heavy metal contamination at the south and east of the site	Ingestion/inhalation of contaminated soil dust Dermal contact with contaminated soil Ingestion of homegrown produce Permeation into drinking water pipes	Residential end users Property	**Medium**	**Unlikely**	Low	Contaminant concentrations in samples of insitu imported topsoil were low and no exceedances of residential land use screening values were identified, therefore, the risk to residential end users and property is considered to be low.
Asbestos at the east of the site	Inhalation of contaminated soil dust	Residential end users	**Medium**	**Unlikely**	Low	No Asbestos was detected in samples of insitu imported topsoil, therefore, the risk to residential end users and property is considered to be low.
Radon	Ground gas permeation into buildings	Residential end users Property	**Medium**	**Unlikely**	Low	The site lies within a Radon Affected Area where it is estimated that between 5% and 10% of homes are likely to be above the Radon Action Level of 200 Becquerels per cubic metre, however, a Rhinoplast Ultra Radon Barrier has been installed within the dwelling floor to mitigate the risk of potential radon gas permeation into the building.

6. Conclusions

6.1 Risk Evaluation

The conceptual site model has identified the following contaminant linkages present at the site and the following conclusions have been drawn:

- There is a **low risk** to residential end users from the ingestion/inhalation of contaminated soil dust, dermal contact with contaminated soil, inhalation of soil vapours, ingestion of homegrown produce and permeation into drinking water pipes from the domestic waste and old car on the site.
- There is a **low risk** to groundwater from the leaching of contaminants through soil from the domestic waste and old car on the site.
- There is a **low risk** to residential end users from the ingestion/inhalation of contaminated soil dust, dermal contact with contaminated soil, inhalation of soil vapours, ingestion of homegrown produce, permeation into drinking water pipes and ground gas permeation into buildings from the historical landfill to the north of the site.

6.2 Further Investigation

Based on the evidence outlined in this report, laboratory testing of soil samples from soft landscaped areas at the site and the updated Conceptual Site Model, remediation work is considered to have sufficiently mitigated the risk to on-site receptors from identified soil contamination and ground gases.

7. References

Environment Agency *Land contamination: risk management.* [online] Available at: <gov.uk/guidance/land-contamination-how-to-manage-the-risks>.

DEFRA, 2014. *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination.* London: Department for the Environmental and Rural Affairs

Nathanail, C.P.; McCaffrey,C.; Gillett, A.G.; Ogden, R.C. & Nathanail, J.F., 2015. *The LQM/CIEH S4ULs for Human Health Risk Assessment.* Nottingham: Land Quality Press

USEPA, 2022. *Regional Screening Levels (RSLs).* [online] Available at: <epa.gov/risk/regional-screening-levels-rsls>.

Oakshire Environmental, 2022. *Phase 1 Preliminary Risk Assessment.*

Oakshire Environmental, 2022. *Phase 2 Intrusive Site Investigation.*

Oakshire Environmental, October 2022. *Phase 3 Remediation Options Appraisal.*

Oakshire Environmental Available at: <oakshireenvironmental.co.uk>.



Appendix - Site Maps & Plans	
Description	
Site location plan	
Sources	
Monte Calvo Architects	
Key	
	Site boundary
▲	North



Appendix - Site Maps & Plans

Description
Site plan showing sample locations with hardstanding and soft landscaped clean cover areas
Sources
Monte Calvo Architects
Key
Site boundary
Hardstanding
Soft Landscaping
Sample location
North



Appendix - Site Photos
Description
Photo showing the installation of the geotextile hi-vis membrane
Sources
Mr Warren



Appendix - Site Photos
Description
Photo showing the installation of the geotextile hi-vis membrane and imported clean cover soil
Sources
Mr Warren



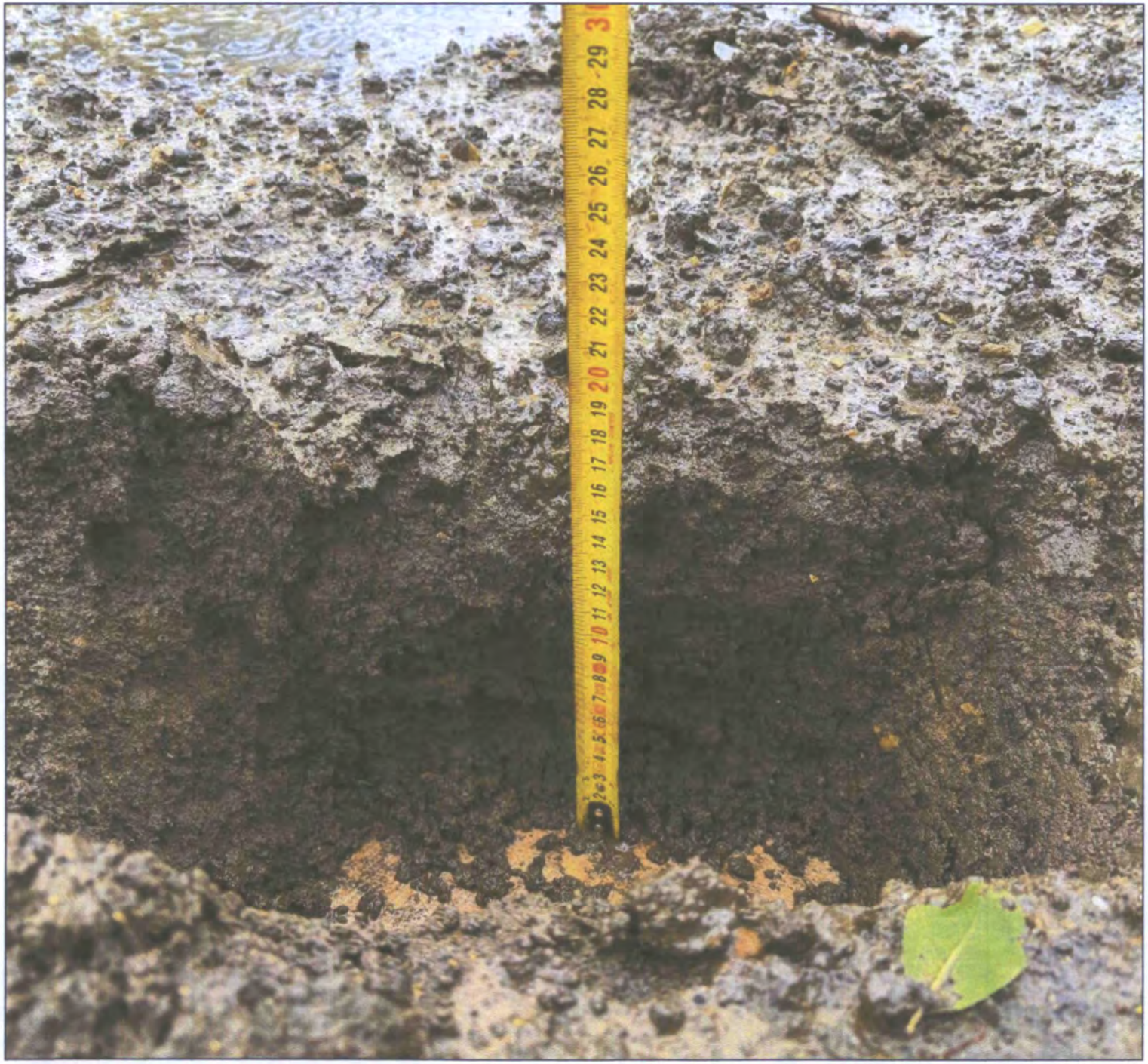
Appendix - Site Photos
Description
Photo showing the installation of the geotextile hi-vis membrane and imported clean cover soil
Sources
Mr Warren



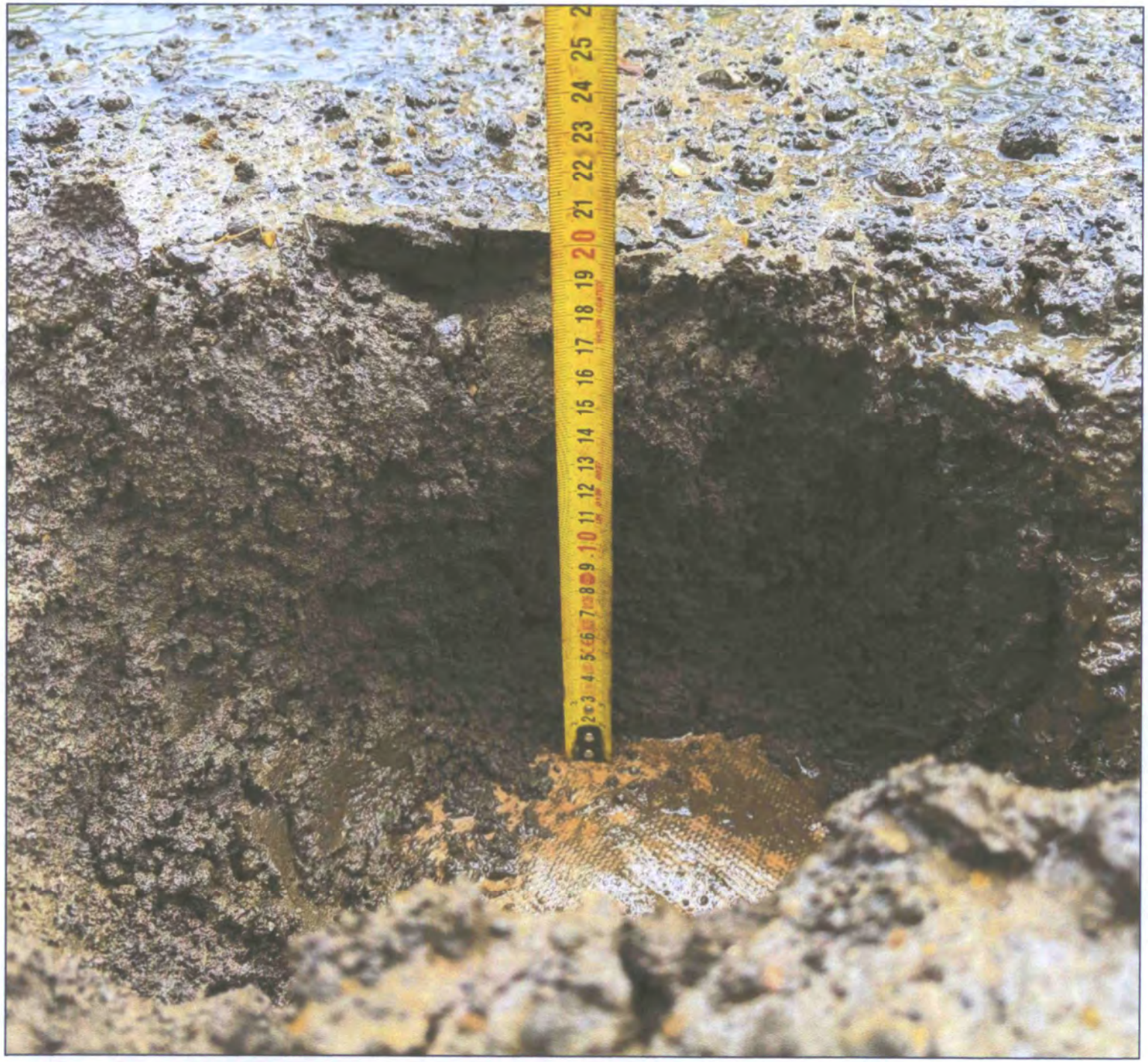
Appendix - Site Photos
Description
Photo showing the installation of the geotextile hi-vis membrane and imported clean cover soil
Sources
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Appendix - Site Photos
Description
Photo showing the depth of clean cover in sample location V01
Sources
Oakshire Environmental



Appendix - Site Photos
Description
Photo showing the depth of clean cover in sample location V02
Sources
Oakshire Environmental



Appendix - Site Photos
Description
Photo showing the depth of clean cover in sample location V03
Sources
Oakshire Environmental



Appendix - Site Photos
Description
Photo showing the completed soft landscaped garden area with imported clean cover topsoil installed
Sources
Oakshire Environmental



Appendix - Site Photos
Description
Photo showing the completed soft landscaped garden area with imported clean cover topsoil installed
Sources
Oakshire Environmental



Appendix - Site Photos
Description
Photo showing hardstanding across the remaining areas at the site
Sources
Mr Warren



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Photo showing hardstanding across the remaining areas at the site
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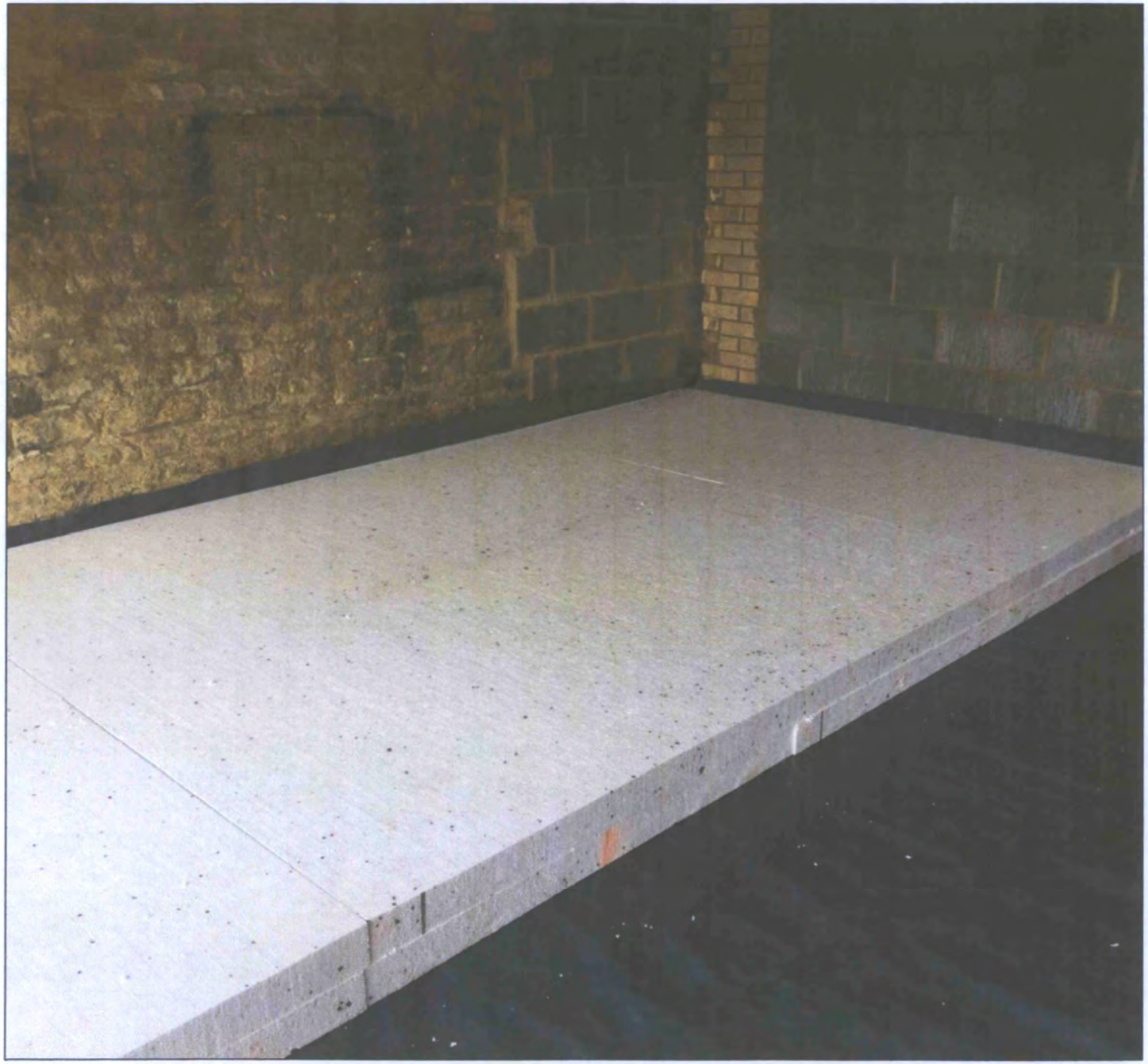
Appendix - Site Photos
Description
Photo showing hardstanding across the remaining areas at the site
Sources
Mr Warren



Appendix - Site Photos
Description
Photo showing the installation of the radon protection membrane
Sources
Mr Warren



Appendix - Site Photos
Description
Photo showing the installation of the radon protection membrane
Sources
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Appendix - Site Photos
Description
Photo showing the installation of the radon protection membrane
Sources
Mr Warren

3C Shared Services
Local Authority Building Control

Mr And Mrs Warren
The Waterfront
12 Elton Road
Wansford
Peterborough
PE8 6JD

buildingcontrol@3csharedservices.org
Tel: 0300 772 9622

Date: 21st August 2024

Dear Sir/Madam

22/03421/PT
Change of use to dwelling
at The Boathouse 24A Elton Road Wansford Peterborough PE8 6JD

Please find attached the Completion Certificate for the above work.

This Completion Certificate is an important document and should be kept with the house deeds etc. The Certificate may be requested on the sale, or future sale, of the property. A charge will be made if further copies of the certificate are requested.

Thank you for your custom, your views are important to us therefore if you can please complete the short survey on the link below we would be most appreciative. It should only take a couple of minutes and you do not have to enter any personal details. Thank you.

https://tinyurl.com/y6xg7ckb

Vicki Focaccio

Technical Consultancy Officer

3C Shared Services
Local Authority Building Control

COMPLETION CERTIFICATE

The Building Act 1984 (as amended)
The Building Regulations 2010 (as amended)

Application No: **22/03421/PT**
Details of Work: **Change of use to dwelling**
Location of Building: **The Boathouse 24A Elton Road Wansford Peterborough PE8 6JD**
Completion Date: **20th August 2024**
Deposit of Particulars: **Compliance with the Building Regulations as stated in Regulation 17:** In accordance with Building Regulation 17 (Completion Certificate) it is evidence (but not conclusive evidence) that the requirements specified in the certificate have been complied with. **Limitations of the Certificate:** Note that this certificate relates only to the work described above. This certificate does not relate to any work carried out to which the regulations do not apply on this occasion, for example to the existing building not affected by an extension work or the work of repair or the replacement of fittings etc.

Signed:

[redacted]

Stephen Kelly
Director of Planning and Economic Development

"Working on behalf of Huntingdonshire District Council"

CAMBRIDGE CITY COUNCIL

Huntingdonshire DISTRICT COUNCIL

LABC Local Authority Building Control

V1.0

Declaration of Compliance BS3882:2015

Soil source: British Sugar TOPSOIL

This declaration confirms that the topsoil represented by the attached Topsoil Analysis Report conforms to the requirements of the British Standard for Topsoil (BS3882:2015).

The sample was sampled and tested in accordance with the requirements of BS3882:2015

- Samples are taken for analysis every 8000 tonnes (5000 m3) of product
- Samples are taken from all TOPSOIL products ready for despatch
- All products are sampled after screening
- Analysis certificates are retained for a period of 5 years

- Laboratory analysis is undertaken at a **UKAS** and **MCERTS** accredited laboratory
- All laboratory methods are in accordance with BS3882:2015
- All British Sugar TOPSOIL products are produced to a **Quality Management System** approved by Lloyd's Register Quality Assurance to **ISO 9001:2008** standard

[redacted]

Natalie Gudgin
British Sugar TOPSOIL, National TOPSOIL Manager
1 Samson Place, London Road, Peterborough, PE7 8QJ
[redacted]

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

[redacted]
British Sugar plc Co-Products
Oundle Road
Peterborough
PE2 9QU

26th March 2024
Our Ref: TOHA/24/1280/SS
Your Ref: PO 60254421

Dear Sirs

Topsoil Analysis Report: Landscape 20 Wissington

We have completed the analysis of the LANDSCAPE 20 TOPSOIL sample recently submitted, referenced *Wi-L20-Mar 24* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the LANDSCAPE 20 TOPSOIL sample for general landscape purposes. 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 submitted to our office, 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 British Sugar factory.

SAMPLE EXAMINATION

The sample was described as a very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable, slightly calcareous SANDY LOAM with a weakly developed, very fine to fine granular 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.

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:

- particle size analysis (sand, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (As, B, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- 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. The interpretation considers the use of the LANDSCAPE 20 TOPSOIL for general landscape purposes and its compliance/non-compliance with our general landscape specification.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

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

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

pH and Electrical Conductivity Values

The sample was alkaline in reaction (pH 7.9), with a pH value that would be suitable for general landscape purposes provided species with a wide pH tolerance or those known to prefer alkaline soils are selected.

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 $CaSO_4$ 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 adequately 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 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 for Assessment of Land Affected by Contamination – Policy Companion Document* (2014). The concentration of barium has been compared with the *residential* land use given in the document *EIC/AGS/CL:AIRE Soil Generic Assessment Criteria for Human Health Risk Assessment* (2010).

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

British Sugar TOPSOIL

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 LANDSCAPE 20 TOPSOIL sample for general landscape purposes. 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).*

From the soil examination and laboratory analysis, the sample was described as an alkaline, non-saline, slightly calcareous *sandy loam* with a weakly developed structure. The sample was virtually stone-free and contained sufficient reserves of organic matter and all major 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.

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

Soil Handling Recommendations

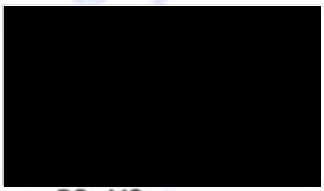
It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic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



BSc MSc
Senior Soil Scientist

For & on behalf of Tim O'Hare Associates LLP

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**British Sugar plc Co-Products**
Client Ref:	**Wissington Landscape 20**
Job:	**Topsoil Analysis**
Date:	**26/03/2024**
Job Ref No:	**TOHA/24/1280/SS**

Sample Reference	**WI-L20-Mar 24**	
Clay (<0.002mm)	% U	18 ✓
Silt (0.002-0.063mm)	% U	20 ✓
Sand (0.063-2.0mm)	% U	62 ✓
Texture Class (UK Classification)	-- U	SL --
Stones (2-20mm)	% DW G	1 ✓
Stones (20-50mm)	% DW G	0 ✓
Stones (>50mm)	% DW G	0 ✓
pH Value (1:2.5 water extract)	units U	7.9 ✓
Electrical Conductivity (1:2.5 water extract)	uS/cm U	1071 ✓
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm U	2935 ✓
Exchangeable Sodium Percentage	% U	9.9 --
Moisture Content	% U	14 --
Organic Matter (LOI)	% U	5.8 ✓
Total Nitrogen (Dumas)	% U	0.23 ✓
C : N Ratio	ratio U	15 ✓
Extractable Phosphorus	mg/l U	81 ✓
Extractable Potassium	mg/l U	803 ✓
Extractable Magnesium	mg/l U	99 ✓
Total Arsenic (As)	mg/kg M	11 ✓
Total Barium (Ba)	mg/kg M	54 ✓
Total Beryllium (Be)	mg/kg M	0.49 ✓
Total Cadmium (Cd)	mg/kg M	< 0.2 ✓
Total Chromium (Cr)	mg/kg M	16 ✓
Hexavalent Chromium (Cr VI)	mg/kg M	< 1.8 ✓
Total Copper (Cu)	mg/kg M	14 ✓
Total Lead (Pb)	mg/kg M	24 ✓
Total Mercury (Hg)	mg/kg M	< 0.3 ✓
Total Nickel (Ni)	mg/kg M	13 ✓
Total Selenium (Se)	mg/kg M	< 1.0 ✓
Total Vanadium (V)	mg/kg M	27 ✓
Total Zinc (Zn)	mg/kg M	50 ✓
Water Soluble Boron (B)	mg/kg M	2.7 ✓
Total Cyanide (CN)	mg/kg M	< 1.0 ✓
Total (mono) Phenols	mg/kg M	< 1.0 ✓
Naphthalene	mg/kg M	< 0.05 ✓
Acenaphthylene	mg/kg M	< 0.05 ✓
Acenaphthene	mg/kg M	< 0.05 ✓
Fluorene	mg/kg M	< 0.05 ✓
Phenanthrene	mg/kg M	0.08 ✓
Anthracene	mg/kg M	< 0.05 ✓
Fluoranthene	mg/kg M	0.16 ✓
Pyrene	mg/kg M	0.14 ✓
Benzo(a)anthracene	mg/kg M	0.07 ✓
Chrysene	mg/kg M	0.08 ✓
Benzo(b)fluoranthene	mg/kg M	0.11 ✓
Benzo(k)fluoranthene	mg/kg M	< 0.05 ✓
Benzo(a)pyrene	mg/kg M	0.08 ✓
Indeno(1,2,3-cd)pyrene	mg/kg M	< 0.05 ✓
Dibenzo(a,h)anthracene	mg/kg M	< 0.05 ✓
Benzo(g,h,i)perylene	mg/kg M	< 0.05 ✓
Total PAHs (sum USEPA16)	mg/kg M	< 0.80 ✓
Aliphatic TPH (C5-C6)	mg/kg M	< 0.020 ✓
Aliphatic TPH (C6-C8)	mg/kg M	< 0.020 ✓
Aliphatic TPH (C8-C10)	mg/kg M	< 0.050 ✓
Aliphatic TPH (C10-C12)	mg/kg M	< 1.0 ✓
Aliphatic TPH (C12-C16)	mg/kg M	< 2.0 ✓
Aliphatic TPH (C16-C21)	mg/kg M	< 8.0 ✓
Aliphatic TPH (C21-C35)	mg/kg M	< 8.0 ✓
Aliphatic TPH (C5-C35)	mg/kg M	< 10 ✓
Aromatic TPH (C5-C7)	mg/kg M	< 0.010 ✓
Aromatic TPH (C7-C8)	mg/kg M	< 0.010 ✓
Aromatic TPH (C8-C10)	mg/kg M	< 0.050 ✓
Aromatic TPH (C10-C12)	mg/kg M	< 1.0 ✓
Aromatic TPH (C12-C16)	mg/kg M	< 2.0 ✓
Aromatic TPH (C16-C21)	mg/kg M	< 10 ✓
Aromatic TPH (C21-C35)	mg/kg M	< 10 ✓
Aromatic TPH (C5-C35)	mg/kg M	< 10 ✓
Benzene	mg/kg M	< 0.005 ✓
Toluene	mg/kg M	< 0.005 ✓
Ethylbenzene	mg/kg M	< 0.005 ✓
p & m-xylene	mg/kg M	< 0.005 ✓
o-xylene	mg/kg M	< 0.005 ✓
Asbestos	ND/D I	Not-detected ✓

Visual Examination

The sample was described as a very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable, slightly calcareous SANDY LOAM with a weakly developed, very fine to fine granular structure. The sample was virtually stone-free, and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

✓	Meets General Landscape Specification
X	Fails General Landscape Specification
SL	SANDY LOAM Texture Class
M	MCERTS accredited method (& UKAS accredited method)
I	ISO 17025 accredited method
U	UKAS accredited method
G	GLP accredited method

This report presents the results of analysis for the sample submitted to our office, 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 British Sugar factory.

[redacted]

Aaron Cross
BSc MSc
Senior Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

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British Sugar TOPSOIL

ANALYTICAL TEST REPORT

Report Number	24-02412, issue number 1
Contract name:	Warren
Client reference:	Warren
Clients name:	Oakshire Environmental
Clients address:	Oakshire Environmental 6 Vine Close Bottesford Nottingham NG13 0FW
Samples received:	03/10/2024
Analysis started:	04/10/2024
Analysis completed:	11/10/2024
Report issued:	11/10/2024

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
U/S	Sample not suitable for testing
NAD	No Asbestos Detected

[redacted]

Approved by: Technical Support Manager

Unit 6 Parkhead, Greencroft Industrial Park, Stanley, County Durham, DH9 7YB

Telephone: (01207) 528578, Email supportsquad@chemtech-env.co.uk

CHEMTECH environmental part of Cawood

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab ref	Sample ID	Depth (m)	Sample description	Material removed	% Removed	% Moisture
15784	V01	0.00 - 0.15	Brown Sandy Loam with Gravel and Vegetation.	-	-	25.4
15785	V02	0.00 - 0.15	Brown Sandy Loam with Gravel and Vegetation.	-	-	23.7
15786	V03	0.00 - 0.15	Brown Sandy Loam with Gravel and Vegetation.	-	-	26.8

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

a	Sampling date not provided
b	Sampling time not provided (waters only)
c	Sample not received in appropriate containers
d	Storage Temperature
e	Headspace present in sample container
f	Sample exceeded sampling to reciept
g	Sample exceeded holding time(s)

Lab ref	Sample ID	Depth (m)	Deviating	Tests (Reason for deviation)
15784	V01	0.00 - 0.15	N	
15785	V02	0.00 - 0.15	N	
15786	V03	0.00 - 0.15	N	

SOILS

Lab Number					15784	15785	15786
Sample ID					V01	V02	V03
Depth (m)					0.00 - 0.15	0.00 - 0.15	0.00 - 0.15
Sampling Date					01/10/2024	01/10/2024	01/10/2024
Test	**Method**	**Accred**	**LoD**	**Units**			
Asbestos							
Asbestos Identification	SUBCON	SU	0	-	NAD	NAD	NAD
Metals							
Arsenic	CE264	U	1.8	mg/kg	6.9	8.8	6.9
Cadmium	CE264	M	1.6	mg/kg	< 1.6	< 1.6	< 1.6
Chromium	CE264	U	2	mg/kg	56.3	68.6	50.4
Copper	CE264	M	1.6	mg/kg	9.9	11.6	9.4
Lead	CE264	U	2.3	mg/kg	3.5	3.9	< 2.3
Mercury	CE264	U	0.7	mg/kg	< 0.7	< 0.7	< 0.7
Nickel	CE264	M	2.1	mg/kg	14.1	17.8	14.9
Selenium	CE264	U	3	mg/kg	< 3.0	< 3.0	< 3.0
Zinc	CE264	M	4	mg/kg	50.8	55.3	48.1
Colourimetric							
Chromium VI	CE263	N	0.04	mg/kg	< 0.040	< 0.040	< 0.040
Chromium III	CE208	N	2	mg/kg	56.3	68.6	50.4
Combustion							
Moisture Content	CE001	N	0.1	%	25.4	23.7	26.8
Total Organic Carbon	CE197	N	0.1	%	4.09	3.79	4.26
Polyaromatic hydrocarbons							
Naphthalene	CE087	M	0.016	mg/kg	< 0.016	< 0.016	< 0.016
Acenaphthylene	CE087	M	0.015	mg/kg	< 0.015	< 0.015	< 0.015
Acenaphthene	CE087	M	0.013	mg/kg	< 0.013	< 0.013	< 0.013
Fluorene	CE087	U	0.013	mg/kg	< 0.013	< 0.013	< 0.013
Phenanthrene	CE087	M	0.014	mg/kg	0.022	0.025	0.116
Anthracene	CE087	U	0.017	mg/kg	< 0.017	< 0.017	0.037
Fluoranthene	CE087	M	0.017	mg/kg	0.068	0.026	0.144
Pyrene	CE087	M	0.016	mg/kg	0.061	0.021	0.115
Benzo(a)anthracene	CE087	U	0.012	mg/kg	0.072	< 0.012	0.092
Chrysene	CE087	M	0.028	mg/kg	0.041	< 0.028	0.064
Benzo(b)fluoranthene	CE087	M	0.02	mg/kg	0.051	< 0.020	0.063
Benzo(k)fluoranthene	CE087	M	0.025	mg/kg	< 0.025	< 0.025	< 0.025

SOILS

Benzo(a)pyrene	CE087	U	0.019	mg/kg	0.039	< 0.019	0.045
Indeno(1,2,3-cd)pyrene	CE087	M	0.019	mg/kg	0.039	< 0.019	0.042
Dibenzo(a,h)anthracene	CE087	M	0.017	mg/kg	< 0.017	< 0.017	< 0.017
Benzo(g,h,i)perylene	CE087	M	0.019	mg/kg	0.029	< 0.019	< 0.019
Total PAH(16)	CE087	N	0.28	mg/kg	0.423	< 0.280	0.716
Wet Chem							
pH	CE004	M	0.1	pH units	7.7	7.7	7.8

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METHOD DETAILS

METHOD	TESTNAME	METHOD SUMMARY	ANALYSIS BASIS
SUBCON	Asbestos Solid	HSG248	Air Dried Sample
CE004	pH of Solids	Potentiometric	As submitted sample
CE264	Metals by ICP in Soil	ICPOES	Air dried sample
CE263	ChromiumVI by Discrete Analyser in Solid	Gallery	Air dried sample
CE087	PAH in Soil	DCM Extraction and GCMS	As submitted sample
CE208	Chromium Hexavalent in Soil	Colorimetry	Air dried sample
CE197	Primacs in Solids	Primacs	Air dried sample

REPORT INFORMATION

Report No.:24-02412, issue number 1

Key

U	ISO17025 Accredited Result
M	ISO17025 and MCERTS Accredited Result
N	Do not currently hold accreditation
^	MCERTS accreditation not applicable for sample matrix
*	ISO17025 accreditation not applicable for sample matrix
S	Subcontracted
I/S	Insufficient Sample
U/S	Unsuitable sample
N/T	Not tested
<	Means "less than"
>	Means "greater than"

LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.

This report shall not be reproduced except in full, without prior written approval.

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

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

The results relate only to the sample received.

Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Moisture Content Calculated on a Wet Weight basis

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

Sampling was undertaken by Chemtech Environmental Limited and is outside the UKAS accreditation scope.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying

For soils and solids, analytical results are inclusive of stones, where applicable.

Sample Retention and Disposal

All soil samples will be retained for a period of 4 weeks from the point of receipt

All water samples will be retained for a period of 2 weeks from the point of Reporting

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