TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr John Coles
Bury Hill Landscape Supplies Ltd
The Boathouse
Old Bury Hill
Westcott
Nr Dorking
Surrey, RH4 3JU

2nd April 2024
Our Ref: TOHA/24/1295/4/SS
Your Ref: see below

Dear Sirs

Topsoil Analysis Report: Bury Hill Horsham Yard – Natural Ericaceous Topsoil (S) 1

We have completed the analysis of the soil sample recently submitted, referenced *Natural Ericaceous Topsoil (S) 1,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as an ericaceous topsoil for calcifuge planting. 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, Specific Purpose Topsoil - Acidic).*

This report presents the results of analysis for the sample collected from the production facility on 11/03/2024 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 Bury Hill Landscape Supplies Ltd site.

SOIL EXAMINATION

The soil was described as very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable, non-calcareous LOAMY SAND with a weakly developed, very fine to medium granular and sub-angular blocky structure*. The stone content of the soil was very low and a high proportion of organic fines and frequent woody fragments were recorded. 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

Registered in England No. OC324049 Registered Office: The Innovation Centre, Howbery Park, Wallingford, Oxfordshire OX10 8BA

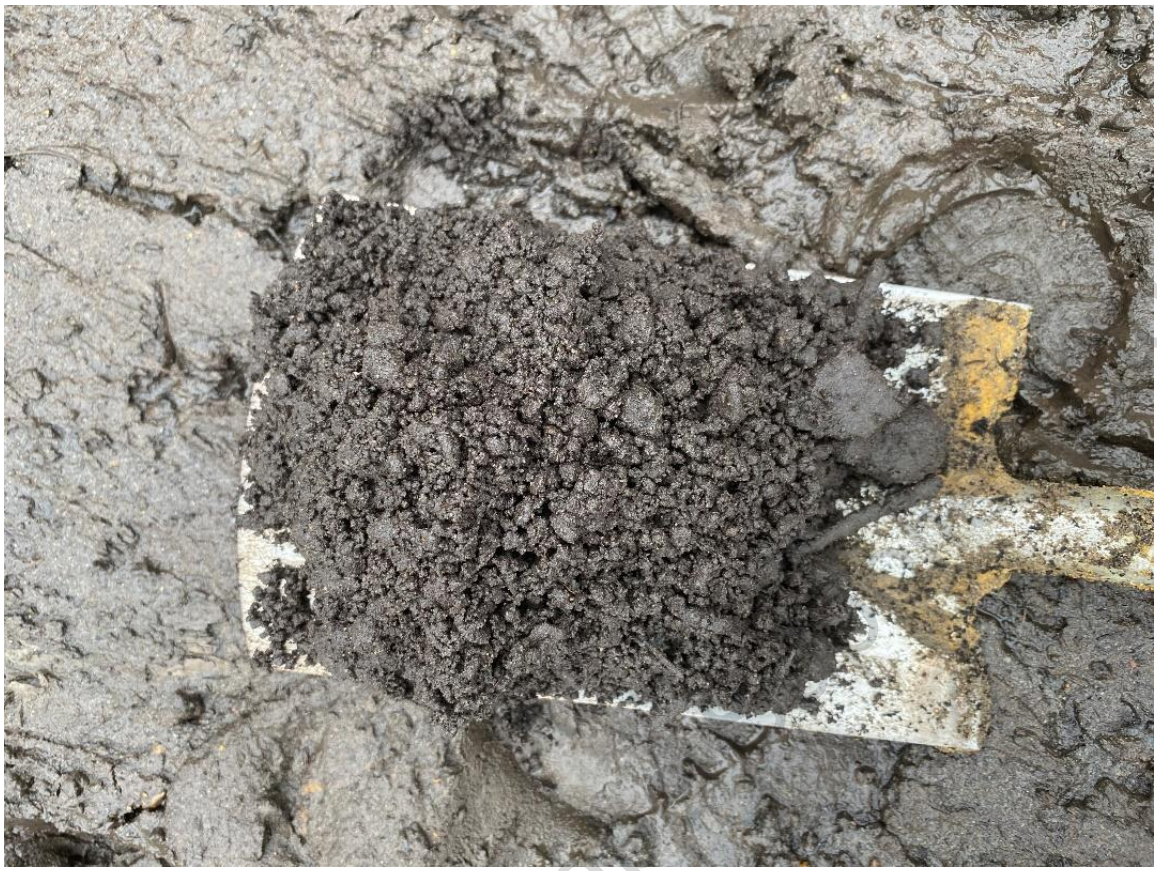

Plate 1: Natural Ericaceous Topsoil (S) Sample

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);
- 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;
- heavy metals (Sb, 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.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *loamy sand* texture class. Further detailed particle size analysis found the sample to contain a high proportion of particles in the *fine sand* (0.15-0.25mm) fraction, followed by *very fine sand* (0.05-0.15mm). Topsoils such as this are prone to self-compaction when initially placed in a landscape environment, which can lead to limited drainage and poor aeration, particularly if the soil has no developed structure. To reduce this risk, we recommend placing this soil to a maximum depth of 300mm, which is in line with *BS3882:2015*, section A.3.

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

pH and Electrical Conductivity Values

The sample was acid in reaction (pH 5.4), with a pH value that would be considered suitable for ericaceous planting. This pH value falls within the range specified within *BS3882:2015 – Table 1* for *Specific Purpose Topsoil - Acidic* (pH 3.5 – 5.5).

The electrical conductivity (salinity) value (water extract) was low, which indicates that soluble salts were not 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 but was deficient in all major plant nutrients. The nutrient content was compliant with the requirements for *Specific Purpose Topsoil* – ***Low Fertility*** *Acidic*. However, should the topsoil be re-used for planting where a more fertile topsoil is required, the delicences would need to be remedied by an appropriate ericaceous compost application.

The C:N ratio was slightly high (21:1) and exceeded the maximum upper limit set by *BS3882:2015 – Table 1* (20:1). This could cause 'nitrogen lock up' and result in growth restriction in sensitive plants in particular.

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 sample for use as an ericaceous topsoil for calcifuge planting. 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, Specific Purpose Topsoil - Acidic).*

From the soil examination and subsequent laboratory analysis, the sample was described as an acid, non-saline, non-calcareous loamy sand with a weakly developed structure and very low stone content. The sample was adequately supplied with organic matter but was deficient in 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 use in ericaceous planting environments, provided the physical condition of the soil is satisfactory. The nutrient content would be suited to creation of habitats suited to low nutrient soils. However, should the topsoil be re-used for planting where a more fertile topsoil is required, the delicences would need to be remedied by an appropriate ericaceous compost application.

The topsoil was largely compliant with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Specific Purpose Topsoil - Acidic)* with the exception of the following non-compliances:

- total nitrogen;
- extractable phosphorus;
- extractable potassium;
- extractable magnesium;
- C:N ratio.

On this occasion, these non-compliances are considered minor in the context of all other results, provided the nutrient deficiencies are addressed through an appropriate ericaceous compost application where necessary. The topsoil is compliant with requirements for *Specific Purpose Topsoil* – ***Low Fertility*** *Acidic* in this instance.

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, 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 faithfully

Harriet MacRae
BSc MSc
Graduate Soil Scientist

Ceri Spears
BSc MSc MISoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bury Hill Landscape Supplies Ltd**
Project:	**Bury Hill Horsham Yard: Ericaceous Topsoil**
Job:	**Topsoil Analysis - BS3882:2015**
Date:	**02/04/2024**
Job Ref No:	**TOHA/24/1295/4/SS**

Sample Reference			**Natural Ericaceous Topsoil (S) 1**
		Accreditation	
Clay (<0.002mm)	%	UKAS	8
Silt (0.002-0.05mm)	%	UKAS	8
Very Fine Sand (0.05-0.15mm)	%	UKAS	21
Fine Sand (0.15-0.25mm)	%	UKAS	48
Medium Sand (0.25-0.50mm)	%	UKAS	14
Coarse Sand (0.50-1.0mm)	%	UKAS	1
Very Coarse Sand (1.0-2.0mm)	%	UKAS	0
Total Sand (0.05-2.0mm)	%	UKAS	84
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	1
Stones (20-50mm)	% DW	GLP	1
Stones (>50mm)	% DW	GLP	0
pH Value (1:2.5 water extract)	units	UKAS	5.4
Calcium Carbonate	%	UKAS	< 1.0
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	167
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2114
Exchangeable Sodium Percentage	%	UKAS	2.1
Organic Matter (LOI)	%	UKAS	4.6
Total Nitrogen (Dumas)	%	UKAS	0.13
C : N Ratio	ratio	UKAS	21
Extractable Phosphorus	mg/l	UKAS	11
Extractable Potassium	mg/l	UKAS	99
Extractable Magnesium	mg/l	UKAS	44
Visible Contaminants: Plastics >2.00mm	%	UKAS	0
Visible Contaminants: Sharps >2.00mm	%	UKAS	0
Total Antimony (Sb)	mg/kg	MCERTS	1
Total Arsenic (As)	mg/kg	MCERTS	5
Total Barium (Ba)	mg/kg	MCERTS	17
Total Beryllium (Be)	mg/kg	MCERTS	0.1
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	14
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 1.8
Total Copper (Cu)	mg/kg	MCERTS	9
Total Lead (Pb)	mg/kg	MCERTS	20
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	2
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	12
Total Zinc (Zn)	mg/kg	MCERTS	40
Water Soluble Boron (B)	mg/kg	MCERTS	0.5
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	0.08
Pyrene	mg/kg	MCERTS	0.10
Benzo(a)anthracene	mg/kg	MCERTS	0.07
Chrysene	mg/kg	MCERTS	0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	0.06
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.020
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.020
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.050
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.010
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.010
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.050
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	13
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	13
Benzene	mg/kg	MCERTS	< 0.005
Toluene	mg/kg	MCERTS	< 0.005
Ethylbenzene	mg/kg	MCERTS	< 0.005
p & m-xylene	mg/kg	MCERTS	< 0.005
o-xylene	mg/kg	MCERTS	< 0.005
Asbestos	ND/D	ISO 17025	Not-detected

LS = LOAMY SAND

Visual Examination

The soil was described as very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable, non-calcareous LOAMY SAND with a weakly developed, very fine to medium granular and sub-angular blocky structure. The stone content of the soil was very low and a high proportion of organic fines and frequent woody fragments were recorded. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

H.MacRae

Harriet MacRae
BSc MSc
Graduate Soil Scientist

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