TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

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

4th October 2024
Our Ref: TOHA/24/1558/1/SS
Your Ref: see below

Dear Sirs

Topsoil Analysis Report: Bury Hill Horsham Yard - GP10 Topsoil (S)

We have completed the analysis of the soil sample recently collected, referenced *GP10 Topsoil (S),* 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 collected from the production site on 16/09/2024, 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, waste designation purposes or for any project-specific application, especially after the topsoil has left the Bury Hill Landscape Supplies Ltd site.

SOIL EXAMINATION

The soil was described as a very dark brown (Munsell Colour 10YR 3/1), moist, friable, non-calcareous LOAMY SAND, with a weakly developed, very fine to medium granular structure*. The soil 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.

Plate 1: Sample GP10 Topsoil (S)

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;
- 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 revealed the sample to have a reasonably narrow particle size distribution, with a predominance of *medium sand* (0.25-0.50mm) to *fine sand* (0.15-0.25mm). This is acceptable for topsoil in general landscape applications as sufficient porosity levels can be maintained in a consolidated state and the risk of particle interpacking is reduced. This type of grading therefore normally provides adequate water attenuation, drainage and aeration properties for general landscape applications.

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

Saturated Hydraulic Conductivity

The saturated hydraulic conductivity test is designed to test the sample's drainage potential under a reasonable degree of compaction. The saturated hydraulic conductivity of the sample was moderate (31 mm/hr) and would be considered suitable for topsoil for general landscape purposes.

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.4). 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 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 adequate to well supplied with organic matter and all major plant nutrients.

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

Potential Contaminants

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

Of the potential contaminants determined, none exceeded their respective guideline values.

Phytotoxic Contaminants

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

CONCLUSION

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).*

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, non-calcareous, loamy sand, with an adequate structure and very low stone content. The sample 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 the physical condition of the soil is satisfactory.

The sample was fully compliant with the requirements of the *British Standard for Topsoil (BS3882:2015 – Specification – 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 sufficiently dry to be 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

H.MacRae

Harriet MacRae
BSc MSc
Soil Scientist

C. Spears.

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**
Job:	**Topsoil Analysis - BS3882:2015**
Date:	**04/10/2024**
Job Ref No:	**TOHA/24/1558/1/SS**

Sample Reference			**GP10 Topsoil (S)**
		Accreditation	
Clay (<0.002mm)	%	UKAS	5
Silt (0.002-0.05mm)	%	UKAS	12
Very Fine Sand (0.05-0.15mm)	%	UKAS	12
Fine Sand (0.15-0.25mm)	%	UKAS	25
Medium Sand (0.25-0.50mm)	%	UKAS	26
Coarse Sand (0.50-1.0mm)	%	UKAS	16
Very Coarse Sand (1.0-2.0mm)	%	UKAS	4
Total Sand (0.05-2.0mm)	%	UKAS	83
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	1
Stones (20-50mm)	% DW	GLP	0
Stones (>50mm)	% DW	GLP	0
Saturated Hydraulic Conductivity (m)	mm/hr	A2LA	31
pH Value (1:2.5 water extract)	units	UKAS	8.4
Calcium Carbonate	%	UKAS	< 1.0
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	847
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2844
Exchangeable Sodium Percentage	%	UKAS	3.6
Organic Matter (LOI)	%	UKAS	4.7
Total Nitrogen (Dumas)	%	UKAS	0.50
C : N Ratio	ratio	UKAS	6
Extractable Phosphorus	mg/l	UKAS	54
Extractable Potassium	mg/l	UKAS	1290
Extractable Magnesium	mg/l	UKAS	112
Visible Contaminants: Plastics >2.00mm	%	UKAS	0
Visible Contaminants: Sharps >2.00mm	%	UKAS	0
Total Antimony (Sb)	mg/kg	MCERTS	< 1.0
Total Arsenic (As)	mg/kg	MCERTS	5
Total Barium (Ba)	mg/kg	MCERTS	31
Total Beryllium (Be)	mg/kg	MCERTS	0.2
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	9
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 1.8
Total Copper (Cu)	mg/kg	MCERTS	18
Total Lead (Pb)	mg/kg	MCERTS	22
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	5
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	13
Total Zinc (Zn)	mg/kg	MCERTS	54
Water Soluble Boron (B)	mg/kg	MCERTS	2.3
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	0.18
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	0.38
Pyrene	mg/kg	MCERTS	0.36
Benzo(a)anthracene	mg/kg	MCERTS	0.22
Chrysene	mg/kg	MCERTS	0.19
Benzo(b)fluoranthene	mg/kg	MCERTS	0.30
Benzo(k)fluoranthene	mg/kg	MCERTS	0.13
Benzo(a)pyrene	mg/kg	MCERTS	0.21
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	0.12
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	0.13
Total PAHs (sum USEPA16)	mg/kg	MCERTS	2.22
Aliphatic TPH (C5-C6)	mg/kg	MCERTS	< 0.010
Aliphatic TPH (C6-C8)	mg/kg	MCERTS	< 0.010
Aliphatic TPH (C8-C10)	mg/kg	MCERTS	< 0.010
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	16
Aliphatic TPH (C5-C35)	mg/kg	MCERTS	16
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	< 0.020
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	21
Aromatic TPH (C5-C35)	mg/kg	MCERTS	21
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	ISO17025	Not-detected

LS = LOAMY SAND

Visual Examination

The soil was described as a very dark brown (Munsell Colour 10YR 3/1), moist, friable, non-calcareous LOAMY SAND, with a weakly developed, very fine to medium granular structure. The soil 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.

H.MacRae

Harriet MacRae
BSc MSc
Soil Scientist

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