



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

5<sup>th</sup> January 2024  
Our Ref: TOHA/24/1197/3/SS  
Your Ref: See below

Dear Sirs

**Topsoil Analysis Report: Bury Hill Horsham Yard – GP10 Lightweight Topsoil (S)**

We have completed the analysis of the soil sample recently submitted, referenced *GP10 Lightweight Topsoil (S)* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the material for use as an intensive lightweight substrate in a rooftop or podium garden environment.

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, waste designation purposes or for any project-specific application, especially after the topsoil has left the Bury Hill Landscape Supplies Ltd site.

**SAMPLE EXAMINATION**

The sample was described as a dark greyish brown (Munsell Colour, 10YR 4/2), very moist, non-plastic, very slightly calcareous LOAMY SAND with a single grain structure. The sample was very slightly stony and contained a high proportion of lightweight expanded clay aggregate 'leca'. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

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



Plate 1: GP10 Lightweight 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);
- bulk density (as received, field capacity);
- moisture content (as received, field capacity);
- saturated hydraulic conductivity;
- pH and electrical conductivity values;
- calcium carbonate;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- 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 *sand* texture class with a predominance of *medium sand* (0.25-0.50mm) and smaller proportions of *coarse sand* (0.50-1.0mm). Such soils typically have good aeration and drainage properties, but can possess poor water and nutrient retention capacities. As a consequence, they often have a greater risk of excessive leaching and drought particularly during dry periods. This topsoil would be considered as 'fast draining' and so will only be suited to plants or planting environments which prefer or require such conditions. Consideration for automatic irrigation should also be made to mitigate these risks.

With the exception of 'leca' particles, the sample had a very low contents of 'stone' sized material (>2mm).

### **Bulk Density and Saturated Hydraulic Conductivity**

The sample displayed a bulk density at Field Capacity of 1.3 Mg/m<sup>3</sup>, which is reasonably low compared to that of standard topsoil. The suitability of the bulk density result should be confirmed by the project engineer for the recipient site.

The saturated hydraulic conductivity of the sample (100 mm/hour) and would be described as 'free-draining' indicating that the substrate is sufficiently permeable and should demonstrate adequate drainage performance for use in rooftop or podium garden environments. Soils used in these environments need to have satisfactory drainage performance to avoid stagnation (and therefore excess weight) and to enable efficient conveyance of water into the drainage system.

### **pH and Electrical Conductivity Values**

The sample was strongly alkaline in reaction (pH 8.5). 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 values were moderate, which indicates that soluble salts should not be present at levels that would be harmful to plants.

### **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**

In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with home grown 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 remaining 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.

## CONCLUSION

The purpose of the analysis was to determine the suitability of the material for use as an intensive lightweight substrate in a roof garden or podium landscape environment.

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, very slightly calcareous sand with a single grain structure and high proportion of 'leca' particles. The sample was adequately supplied with organic matter and all major plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

Based on our findings, the substrate represented by this sample would be suitable for use as a lightweight intensive substrate for landscaping purposes in a roof garden or podium environment provided a free-draining topsoil is required and the risk of drought conditions are acceptable. Consideration must also be made for automatic irrigation. Plant species selected should be tolerant of alkaline soil conditions and the soil must be adequately structured.

The substrate should be underlain by a suitably graded subsoil product to interface with underlying structures and / or drainage infrastructure, as appropriate. The suitability of the bulk density and the drainage properties should be confirmed by the project engineer.

### 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. If the soil is compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction prior to any planting, turfing or seeding.

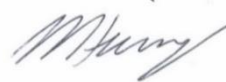
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We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



**Harriet MacRae**  
BSc MSc  
Graduate Soil Scientist



**Matthew Heins**  
BSc (Hons) MISOilSci  
Senior Soil Scientist

For & on behalf of Tim O'Hare Associates LLP





Client:	Bury Hill Landscape Supplies Ltd
Project:	Bury Hill Horsham Yard
Job:	Topsoil Analysis
Date:	05/01/2024
Job Ref No:	TOHA/24/1197/3/SS

Sample Reference			GP10 Lightweight Topsoil (S)
		Accreditation	
Clay (<0.002mm)	%	UKAS	3
Silt (0.002-0.05mm)	%	UKAS	2
Very Fine Sand (0.05-0.15mm)	%	UKAS	3
Fine Sand (0.15-0.25mm)	%	UKAS	6
Medium Sand (0.25-0.50mm)	%	UKAS	48
Coarse Sand (0.50-1.0mm)	%	UKAS	30
Very Coarse Sand (1.0-2.0mm)	%	UKAS	8
Total Sand (0.05-2.0mm)	%	UKAS	95
Texture Class (UK Classification)		UKAS	5
Stones (2-20mm)	% DW	GLP	1
Stones (20-50mm)	% DW	GLP	0
Stones (>50mm)	% DW	GLP	0
Bulk Density (As Received)	Mg/m3	UKAS	1.24
Bulk Density (Field Capacity)	Mg/m3	UKAS	1.31
Moisture Content (As Received)	%	UKAS	27
Moisture Content (Field Capacity)	%	UKAS	36
Saturated Hydraulic Conductivity (m)	mm/hr	A2LA	100
pH Value (1:2.5 water extract)	units	UKAS	8.5
Calcium Carbonate	%	UKAS	1.4
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	1111
Electrical Conductivity (1:2 CaSO <sub>4</sub> extract)	uS/cm	UKAS	3268
Exchangeable Sodium Percentage	%	UKAS	4.3
Organic Matter (LOI)	%	UKAS	4.5
Total Nitrogen (Dumas)	%	UKAS	0.19
C : N Ratio	ratio	UKAS	14
Extractable Phosphorus	mg/l	UKAS	66
Extractable Potassium	mg/l	UKAS	922
Extractable Magnesium	mg/l	UKAS	114
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	7
Total Barium (Ba)	mg/kg	MCERTS	27
Total Beryllium (Be)	mg/kg	MCERTS	0.21
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	9.5
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 1.8
Total Copper (Cu)	mg/kg	MCERTS	11
Total Lead (Pb)	mg/kg	MCERTS	9.9
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	9
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	14
Total Zinc (Zn)	mg/kg	MCERTS	30
Water Soluble Boron (B)	mg/kg	MCERTS	2
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Naphthalene	mg/kg	MCERTS	0.14
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	0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
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
Dibenzof(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	< 10
Aromatic TPH (C5-C35)	mg/kg	MCERTS	< 10
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

S = SAND

#### Visual Examination

The sample was described as a dark greyish brown (Munsell Colour, 10YR 4/2), very moist, non-plastic, very slightly calcareous SAND with a single grain structure. The sample was stone free and contained a proportion of lightweight expanded clay aggregate 'leca'. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

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

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H. MacRae

Harriet MacRae  
BSc MSc  
Graduate Soil Scientist