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The Estate Office
Old Bury Hill
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Surrey, RH4 3JU

24<sup>th</sup> November 2022 Our Ref: TOHA/22/7762/SS

Your Ref: see below

#### **Dear Sirs**

# Topsoil Analysis Report: Bury Hill Horsham Yard - Lawn Topsoil (PL)

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

The purpose of the analysis was to determine the suitability of the sample specifically for use as a 'lawn topsoil' for high-performance amenity grass areas with good compaction resistance, high wear tolerance, and where supplementary irrigation is available.

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 Bury Hill Landscape Supplies Ltd site.

## SAMPLE EXAMINATION

The sample was described as a dark yellowish brown (Munsell Colour 10YR 4/4), slightly moist, friable, non-calcareous SAND with a single grain structure. The stone content of the sample was very low and contained a moderate proportion of organic fines and it occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.



Plate 1: Sample Lawn Topsoil (PL)

#### 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;
- heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- 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.

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#### RESULTS OF ANALYSIS

### Particle Size Analysis and Stone Content

The sample fell into the *sand* texture class. Further detailed particle sized distribution found the sample to have a sufficiently narrow particle size distribution, and a predominance of *medium sand* (0.25-0.50mm), with a smaller proportion of *coarse sand* (0.50-1.0mm). This is acceptable for high-use grass areas as sufficient porosity levels are maintained in a compacted state and the risk of particle interpacking and surface smearing is minimised.

High sand content soils typically have good aeration, drainage and compaction-resistance properties, but can possess reduced water and nutrient retention capacities. As such, it will be important that the lawn be suitably maintained (seasonal fertiliser applications, irrigation, decompaction etc.) as part of an ongoing maintenance regime.

The sample was virtually stone-free and as such, stones will not restrict the use of the soil.

# Saturated Hydraulic Conductivity

The saturated hydraulic conductivity rate (49 mm/hr) recorded under a degree of consolidation was moderate and acceptable for many applications. However, it would not be considered 'fast-draining', where a rate of over 150 mm/hr is usually observed.

The combination of this drainage rate and the soil's particle size distribution should offer a good balance of water retention for plant uptake and drainage of surplus water over a period of time.

## pH and Electrical Conductivity Values

The sample was alkaline in reaction (pH 7.7). This pH value would be considered suitable for general landscape purposes provided grass species with a wide pH tolerance or those known to prefer alkaline soils are selected.

The electrical conductivity (salinity) values (water and CaSO<sub>4</sub> extract) were moderate, which indicates that soluble salts were not 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 landscape applications.

## **Potential Contaminants**

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.

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#### **CONCLUSION**

The purpose of the analysis was to determine the suitability of the sample for use as a topsoil for highperformance amenity grass / lawn areas.

From the soil examination and subsequent laboratory analysis, the sample was described as an alkaline, nonsaline, non-calcareous 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 high-use lawn areas that are supported by irrigation.

A suitable maintenance regime should be implemented to support the establishment and continued growth of the grass sward (e.g. decompaction, aeration, fertiliser applications, etc.).

### Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid compaction during all phases of soil handling (e.g. stockpiling, respreading, cultivating, seeding or turfing). As a consequence, soil handling operations should be carried out when soil and the underlying ground is sufficiently dry and stable.

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 ground has dried out. If the soil is compacted at any stage during the course of soiling or landscaping works, it should be decompacted appropriately.

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

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Lawn Topsoil (PL)

Client:	Bury Hill Landscape Supplies Ltd
Project:	Bury Hill Horsham yard - Lawn Topsoil (PL)
Job:	Topsoil Analysis
Date:	24/11/2022
Job Ref No:	TOHA/22/7762/SS

Sample Reference

Sample Reference		Lawn Topsoil (PL)	
Clay (<0.002mm)	%	7	1
Silt (0.002-0.05mm)	%	4	
Very Fine Sand (0.05-0.15mm)	%	2	
Fine Sand (0.05-0.15/mm)	%	7	
Medium Sand (0.15-0.25mm)	%	50	
	%		
Coarse Sand (0.50-1.0mm)		28	
Very Coarse Sand (1.0-2.0mm)	%	2	
Total Sand (0.05-2.0mm)	%	89	
Texture Class (UK Classification)		S	
Stones (>2mm)	% DW	1	
Stones (>20mm)	% DW	0	
Stones (>50mm)	% DW	0	
Saturated Hydraulic Conductivity	mm/hr	49	
pH Value (1:2.5 water extract)	units	7.7	
Calcium Carbonate	%	< 1.0	
Electrical Conductivity (1:2.5 water extract)	uS/cm	737	
Electrical Conductivity (1:2 CaSO <sub>4</sub> extract)	uS/cm	2786	A'A W
Exchangeable Sodium Percentage	%	4.9	
Organic Matter (LOI)	%	3.2	
Total Nitrogen (Dumas)	%	0.16	
C : N Ratio	ratio	12	4 7
Extractable Phosphorus	mg/l	18	
Extractable Potassium	mg/l	748	
Extractable Magnesium	mg/l	96	
Extraorable Magnesium	1119/1	90	
Total Amenia (Ac)	mc/l	6	
Total Arsenic (As)	mg/kg		
Total Cadmium (Cd)	mg/kg	< 0.2	
Total Chromium (Cr)	mg/kg	7	
Hexavalent Chromium (Cr VI)	mg/kg	< 1.8	
Total Copper (Cu)	mg/kg	10	
Total Lead (Pb)	mg/kg	9	
Total Mercury (Hg)	mg/kg	< 0.3	
Total Nickel (Ni)	mg/kg	2	
Total Selenium (Se)	mg/kg	< 1.0	
Total Zinc (Zn)	mg/kg	11	
Water Soluble Boron (B)	mg/kg	0.8	
Total (mono) Phenols	mg/kg	< 1.0	
			•
Naphthalene	mg/kg	< 0.05	
Acenaphthylene	mg/kg	< 0.05	1
		< 0.05	†
Acenaphthene	mg/kg		1
Fluorene	mg/kg	< 0.05	1
Phenanthrene	mg/kg	< 0.05	
Anthracene	mg/kg	< 0.05	1
Fluoranthene	mg/kg	< 0.05	-
Pyrene	mg/kg	< 0.05	
Benz(a)anthracene	mg/kg	< 0.05	
Chrysene	mg/kg	< 0.05	
Benzo(b)fluoranthene	mg/kg	< 0.05	
Benzo(k)fluoranthene	mg/kg	< 0.05	
Benzo(a)pyrene	mg/kg	< 0.05	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.05	
Dibenzo(a,h)anthracene	mg/kg	< 0.05	
Benzo(g,h,i)perylene	mg/kg	< 0.05	
Total PAHs (sum USEPA16)	mg/kg	< 0.80	1
			•
Aliphatic TPH >C5 - C6	mg/kg	< 0.001	
Aliphatic TPH >C6 - C8	mg/kg	< 0.001	1
Aliphatic TPH >C8 - C10	mg/kg	< 0.001	1
Aliphatic TPH >C10 - C12	mg/kg	< 1.0	1
Aliphatic TPH >C12 - C16	mg/kg	< 2.0	
		< 8.0	†
Aliphatic TPH > C16 - C21	mg/kg		†
Aliphatic TPH > C21 - C35	mg/kg	< 8.0	1
Aliphatic TPH (C5 - C35)	mg/kg	< 10	-
Aliphatic TPH >C35 - C44	mg/kg	< 8.4	
Aromatic TPH >C5 - C7	mg/kg	< 0.001	
Aromatic TPH >C7 - C8	mg/kg	< 0.001	
Aromatic TPH >C8 - C10	mg/kg	< 0.001	
Aromatic TPH >C10 - C12	mg/kg	< 1.0	
Aromatic TPH >C12 - C16	mg/kg	< 2.0	
Aromatic TPH >C16 - C21	mg/kg	< 10	
Aromatic TPH >C21 - C35	mg/kg	< 10	
Aromatic TPH (C5 - C35)	mg/kg	< 10	1
Aromatic TPH >C35 - C44	mg/kg	< 8.4	1
montaine II II 2000 OTT	mg/kg	× 0.7	1
Renzene	ma/ka	< 0.001	1
Benzene	mg/kg		1
Toluene	mg/kg	< 0.001	1
Ethylbenzene	mg/kg	< 0.001	1
m-xylene	mg/kg	< 0.001	-
o-xylene	mg/kg	< 0.001	
p-xylene	mg/kg	< 0.001	1
			_
Asbestos	ND/D	Not detected	

S = SAND

Visual Examination

The sample was described as a dark yellowish brown (Munsell Colour 10YR 4/4), slightly moist, friable, non-calcareous SAND with a single grain structure. The stone content of the sample was very low and it contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were

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