



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

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5th April 2024
Our Ref: TOHA/23/1295/2/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 collected from the production site 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 a very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable, non-calcareous SAND, with a weakly developed, very fine to medium granular structure*. The stone content of the soil was very low, and a moderate proportion of organic fines and occasional 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(s). Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

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Plate 1: Lawn Topsoil (PL) 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);
- 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.

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 is suitably maintained (seasonal fertiliser applications, irrigation, decompaction etc.) as part of an ongoing maintenance regime.

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.

Saturated Hydraulic Conductivity

The saturated hydraulic conductivity rate (133 mm/hr) recorded under a degree of consolidation was moderately high and acceptable for many lawn applications. However, the recorded rate is a little slower than that usually necessary for high performance lawns in the most heavily used areas, where a rate of over 150 mm/hr could be expected.

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 strongly alkaline in reaction (pH 8.5) and non-calcareous ($\text{CaCO}_3 < 1\%$). The main source of the 'alkalinity' is likely to be the potassium ions from the compost in the sample. As such, this pH value would be considered suitable for most grass cultivars.

The electrical conductivity (salinity) values (water and CaSO_4 extract) were moderate, which indicates that soluble salts should not present at levels that would be harmful to plants.

Organic Matter and Fertility Status

The sample was adequately supplied with organic matter and major plant nutrients.

The organic matter content is a little higher than that considered ideal for lawns that receive particularly heavy use as this may reduce compaction resistance.

The C:N ratio (18:1) acceptable for 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 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 use as a topsoil for high-performance amenity grass / lawn areas.

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, non-calcareous sand with an adequate structure and very low stone content. The sample contained sufficient reserves of organic matter and 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 lawns receiving moderate use, provided they are supported by irrigation. The saturated hydraulic conductivity and organic matter content are slightly out of range for a high performance lawn rootzone for areas receiving heavy use. The suitability of the soil should be assessed for any project specific requirements.

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
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Graduate Soil Scientist



Ceri Spears
BSc MSc MISOilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP



Client:	Bury Hill Landscape Supplies Ltd
Project:	Bury Hill Horsham yard - Lawn Topsoil (PL)
Job:	Topsoil Analysis
Date:	05/04/2024
Job Ref No:	TOHA/24/1295/2/SS

Sample Reference			Lawn Topsoil (PL)	
Clay (<0.002mm)	%	UKAS		4
Silt (0.002-0.05mm)	%	UKAS		6
Very Fine Sand (0.05-0.15mm)	%	UKAS		5
Fine Sand (0.15-0.25mm)	%	UKAS		13
Medium Sand (0.25-0.50mm)	%	UKAS		44
Coarse Sand (0.50-1.0mm)	%	UKAS		24
Very Coarse Sand (1.0-2.0mm)	%	UKAS		4
Total Sand (0.05-2.0mm)	%	UKAS		90
Texture Class (UK Classification)	--	UKAS		S
Stones (2-20mm)	% DW	GLP		1
Stones (20-50mm)	% DW	GLP		0
Stones (>50mm)	% DW	GLP		0
Saturated Hydraulic Conductivity (m)	mm/hr	A2LA		133
pH Value (1:2.5 water extract)	units	UKAS		8.5
Calcium Carbonate	%	UKAS		< 1.0
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS		784
Electrical Conductivity (1:2 CaSO ₄ extract)	uS/cm	UKAS		2845
Exchangeable Sodium Percentage	%	UKAS		3.1
Organic Matter (LOI)	%	UKAS		5.2
Total Nitrogen (Dumas)	%	UKAS		0.17
C : N Ratio	ratio	UKAS		18
Extractable Phosphorus	mg/l	UKAS		45
Extractable Potassium	mg/l	UKAS		926
Extractable Magnesium	mg/l	UKAS		97
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		3
Total Barium (Ba)	mg/kg	MCERTS		12
Total Beryllium (Be)	mg/kg	MCERTS		0.1
Total Cadmium (Cd)	mg/kg	MCERTS		< 0.2
Total Chromium (Cr)	mg/kg	MCERTS		10
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS		< 1.8
Total Copper (Cu)	mg/kg	MCERTS		9
Total Lead (Pb)	mg/kg	MCERTS		9
Total Mercury (Hg)	mg/kg	MCERTS		< 0.3
Total Nickel (Ni)	mg/kg	MCERTS		3
Total Selenium (Se)	mg/kg	MCERTS		< 1.0
Total Vanadium (V)	mg/kg	MCERTS		9
Total Zinc (Zn)	mg/kg	MCERTS		21
Water Soluble Boron (B)	mg/kg	MCERTS		1.3
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		< 0.05
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
Dibenzo(a,h)anthracene	mg/kg	MCERTS		< 0.05
Benzo(a,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		10
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		16
Aromatic TPH (C5-C35)	mg/kg	MCERTS		16
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 soil was described as a very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable, non-calcareous SAND with a weakly developed, very fine to medium granular structure. The stone content of the soil was very low and a moderate proportion of organic fines and occasional woody fragments were recorded. 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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Harriet MacRae
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H.MacRae