TIM O'HARE ASSOCIATES

SOIL & LANDSCAPE CONSULTANCY

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25th November 2025
Our Ref: TOHA/25/7081/2/SS
Your Ref: PO 445157

Dear Sirs

Topsoil Analysis Report: Barnsdale Landscape Grade Topsoil

We have completed the analysis of the soil sample recently collected from site, referenced *Barnsdale Landscape Grade Topsoil* 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 and requirements for use – Table 1, Multipurpose Topsoil)*.

This report presents the results of analysis for the sample collected on 12/11/2025, 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, especially after the topsoil has left the Green-tech Ltd site.

SAMPLING

The topsoil was examined and sampled at the Green-tech Ltd source at Barnsdale Bar Quarry on 12/11/2025 by Ebony Gheorghe of Tim O'Hare Associates LLP. The topsoil sample was taken from 1 No. available soil heap. A representative composite topsoil sample was collected in accordance with Section 5 (*Sampling of topsoil*) of the British Standard for Topsoil (*BS3882:2015 Specification for Topsoil*).

Plate 1: Heap of Barnsdale Landscape Grade Topsoil

Plate 2: Barnsdale Landscape Grade Topsoil

Visual Examination

The topsoil was described as reddish brown (Munsell Colour 2.5 YR 5/6) slightly moist, friable, slightly calcareous LOAMY SAND with a single structure. The soil was virtually stone-free and contained moderate proportion of organic fines and occasional fine woody fragments. No unusual odours and deleterious materials were observed.

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;
- 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;
- aromatic and aliphatic TPH (C5-C35 banding);
- speciated PAHs (US EPA16 suite);
- 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

***Detailed Particle Size Analysis and Stone* Content**

The sample fell into the *loamy sand* texture class. Further detailed particle size analysis found the sample to have a sufficiently narrow particle size distribution and a predominance of *fine sand* (0.15-0.25mm) and *medium sand* (0.25-0.50mm). This is usually ideal for topsoil in general landscape applications as reasonable 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.

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 (salinity) value (water extract) was moderate, which indicates that soluble salts should not be 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 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).

Note due to the dark colour of the sample, the colorimetry analysis of hexavalent chromium could not be performed in this instance (noted as U/S - unsuitable sample on the certificate). In this instance, the laboratory has provided additional, unaccredited, testing for hexavalent chromium in this sample by ion chromatography, which was reported to be less than the limit of detection (< 1.80 mg/kg).

Of the remaining 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 topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for topsoil and requirements for use – Table 1, Multipurpose Topsoil)*.

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, slightly calcareous, virtually stone-free *loamy sand* with a single grain structure. 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 the physical condition of the soil is satisfactory and species with a wide pH tolerance or those known to prefer alkaline soils are selected.

The topsoil was fully compliant with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil)*.

General Landscape Environments

Rootballed Trees

The most demanding planting environment is often that of large, rootballed, pit planted trees. Trees of this size and age have grown accustomed to optimum growing conditions in the nursery, and these need to be replicated when the rootballed or containerised tree is planted in the pit. In particular, aeration and drainage around the rootball are critical. Without these properties, trees will very quickly suffer and possibly die during their first few growing seasons after planting. The topsoil would be suitable for backfilling the upper 300mm of a tree pit, provided it is accompanied by a suitable quality subsoil below, and the pit is adequately drained.

Shrubs

Containerised shrubs are generally more tolerant of a wider range of soil-types, and they require less topsoil to root into than trees. The topsoil would be suited to a range of shrubs typically used in commercial and domestic landscaping.

Forestry Stock

Less demanding planting habitats include indigenous woodland planting, planted as small whips and feathered trees. The topsoil would be suitable for such planting environments.

Amenity Grass

This soil would be considered suitable for amenity grass seeding and turfing

Sports Pitches

This soil is suited for sports pitch construction given its high sand content. However, all materials to be used for sports pitch construction, including topsoil, should be carefully considered in relation to the required performance and standard of the sports pitch.

Domestic Gardens

The horticultural properties of the soil would be suitable for domestic garden applications. In addition, of the potential contaminants determined, none was found at levels that would be considered elevated. However, permissible levels for potential contaminants do vary from site to site. Therefore, the suitability of topsoil represented by this sample for any particular project or development should be confirmed by comparing the results against the site's specific assessment criteria.

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

Ebony Gheorghe
BSc MSc
Soil Scientist

Tim White
BSc MSc MISoilSci CSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	Green-tech Ltd
Project:	Barnsdale Landscape Grade Topsoil
Job:	Topsoil Analysis - BS 3882:2015
Date:	25/11/2025
Job Ref No:	TOHA025/T061@SS

Sample Reference			Landscape Grade Topsoil
		Accreditation	
Clay (<0.002mm)	%	UKAS	5
Silt (0.002-0.05mm)	%	UKAS	17
Very Fine Sand (0.05-0.15mm)	%	UKAS	16
Fine Sand (0.15-0.25mm)	%	UKAS	29
Medium Sand (0.25-0.50mm)	%	UKAS	25
Coarse Sand (0.50-1.0mm)	%	UKAS	4
Very Coarse Sand (1.0-2.0mm)	%	UKAS	5
Total Sand (0.05-2.0mm)	%	UKAS	78
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	1
Stones (20-50mm)	% DW	GLP	0
Stones (>50mm)	% DW	GLP	0

pH Value (1:2.5 water extract)	units	UKAS	8.5
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	842
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2494
Exchangeable Sodium Percentage	%	UKAS	2.7
Organic Matter (LOI)	%	UKAS	4.5
Total Nitrogen (Dumas)	%	UKAS	0.23
C : N Ratio	ratio	UKAS	12
Extractable Phosphorus	mg/l	UKAS	23
Extractable Potassium	mg/l	UKAS	594
Extractable Magnesium	mg/l	UKAS	234

Total Arsenic (As)	mg/kg	MCERTS	2
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	6
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	U/S
Total Copper (Cu)	mg/kg	MCERTS	17
Total Lead (Pb)	mg/kg	MCERTS	14
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	7
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Zinc (Zn)	mg/kg	MCERTS	46
Water Soluble Boron (B)	mg/kg	MCERTS	1.1
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	0.07
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	0.08
Pyrene	mg/kg	MCERTS	0.07
Benzo(a)anthracene	mg/kg	MCERTS	0.06
Chrysene	mg/kg	MCERTS	0.07
Benzo(b)fluoranthene	mg/kg	MCERTS	0.12
Benzo(k)fluoranthene	mg/kg	MCERTS	0.06
Benzo(a)pyrene	mg/kg	MCERTS	0.09
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	0.07
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80

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	< 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	< 0.020
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	< 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	< 0.008
o-xylene	mg/kg	MCERTS	< 0.005
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.005

Asbestos	N:D/D	ISO 17025	Not detected

LS = LOAMY SAND
U/S = Unsuitable Sample

Visual Examination

The topsoil was described as a reddish brown (Munsell Colour 2.5 YR 5/6) slightly moist, friable, slightly calcareous LOAMY SAND with a single structure. The soil was virtually stone-free and contained moderate proportion of organic fines and occasional fine woody fragments. No unusual odours and deleterious materials were observed.

Ebony Gheorghe
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Soil Scientist

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