TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Stephen Edwards
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The Chestnuts
Wilberfoss
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23rd December 2013
Our Ref: TOHA/14/4804/1/JU
Your Ref: as below

Dear Sirs

Topsoil Analysis Report: Wissington – WI/L20/1213

We have completed the analysis of the Multipurpose TOPSOIL sample recently submitted and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the Multipurpose TOPSOIL sample for general landscape purposes. In addition, this sample has been assessed to determine compliance with the requirements of the British Standard for Topsoil *(BS3882:2007 - Specification for topsoil and requirements for use* – Table 1, *Multipurpose Topsoil)*.

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.

SAMPLE EXAMINATION

The sample was described as a dark greyish brown, dry, friable SANDY LOAM with a moderately developed fine to medium granular structure*. The sample was stone-free and no 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.

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 absence of potential contaminants. The following parameters were determined:

- particle size analysis and stone content;
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn);
- soluble sulphate, elemental sulphur, acid volatile sulphide;
- total cyanide and total (mono) phenols;
- aromatic and aliphatic TPH (C5-C35 banding);
- speciated PAHs (US EPA16 suite);
- benzene, toluene, ethylbenzene, xylene;
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below. The interpretation considers the use of the Multipurpose TOPSOIL for general landscape purposes and its compliance/non-compliance with our general landscape specification.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The sample fell into the *sandy loam* texture class, which is usually considered suitable for general landscape applications, provided the soil's physical condition is maintained.

The sample was 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 alkaline in reaction (pH 7.9). This pH value would be considered suitable for general landscape purposes providing 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 (2800 µS/cm) given in *BS3882:2007 – Table 1*.

Organic Matter and Fertility Status

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

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

Potential Contaminants

With reference to *BS3882:2007 - Table 1*: Notes 2, 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 of selected potential contaminants that affect human health have been assessed for *residential* end-use against the Soil Guideline Values (SGV) presented in the Contaminated Land Exposure Assessment (CLEA) (EA/DEFRA: 2009) and the CIEH/LQM Generic Assessment Criteria (GAC) (2nd Edition, 2009).

Of the potential contaminants determined, none exceeded their respective SGV or GAC 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 *BS3882:2007 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the Multipurpose TOPSOIL sample for general landscape purposes.

From the soil examination and laboratory analysis, the sample is described as an alkaline, non-saline, stone-free sandy loam with an adequate structure. The organic matter and fertility status were moderately high. Of the potential contaminants determined, none exceeded their respective SGV or GAC values.

To conclude based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes, provided species with a broad pH tolerance are selected for planting and the soil's physical condition is maintained.

The sample was fully compliant with the requirements of the British Standard for Topsoil *(BS3882:2007 – Specification for topsoil and requirements for use – Table 1, Multipurpose Topsoil).*

RECOMMENDATIONS

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). 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.

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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 sincerely

Joanna Uglow
BSc MSc
Soil Scientist

Laura Hathaway-Jenkins
BSc MSc EngD MISoilSci
Soil Scientist

For & on behalf of Tim O'Hare Associates LLP

Client:	**Inturf**
Client Ref:	**Topsoil Analysis - Multipurpose TOPSOIL**
Date:	**December 2013**
Job Ref No:	**TOHA/13/4804/1/JU**

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SOIL & LANDSCAPE CONSULTANCY

Sample Reference			**WIS/L20/1213**	
Clay (<0.002mm)	%	U	15	✓
Silt (0.002-0.063mm)	%	U	25	✓
Sand (0.063-2.0mm)	%	U	60	✓
Texture Class (UK Classification)	--	U	SL	--
Stones (2-20mm)	% DW	G	0	✓
Stones (20-50mm)	% DW	G	0	✓
Stones (>50mm)	% DW	G	0	✓
pH Value (1:2.5 water extract)	units	G	7.9	✓
Electrical Conductivity (1:2.5 water extract)	uS/cm	U	1130	✓
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	U	2786	✓
Exchangeable Sodium Percentage	%	U	8.8	✓
Moisture Content	%	U	17	✓
Organic Matter (WB)	%	U	6.0	✓
Total Nitrogen (Dumas)	%	U	0.28	✓
C : N Ratio	:1	U	12	✓
Extractable Phosphorus	mg/l	U	34	✓
Extractable Potassium	mg/l	U	688	✓
Extractable Magnesium	mg/l	U	97	✓
Total Arsenic (As)	mg/kg	M	10	✓
Total Barium (Ba)	mg/kg	M	39	✓
Total Beryllium (Be)	mg/kg	M	0.4	✓
Total Cadmium (Cd)	mg/kg	M	< 0.2	✓
Total Chromium (Cr)	mg/kg	M	17	✓
Hexavalent Chromium (Cr VI)	mg/kg	M	< 4.0	✓
Total Copper (Cu)	mg/kg	M	14	✓
Total Lead (Pb)	mg/kg	M	18	✓
Total Mercury (Hg)	mg/kg	M	< 0.3	✓
Total Nickel (Ni)	mg/kg	M	12	✓
Total Selenium (Se)	mg/kg	M	< 1.0	✓
Total Vanadium (V)	mg/kg	M	25	✓
Total Zinc (Zn)	mg/kg	M	43	✓
Water Soluble Boron (B)	mg/kg	M	1.9	✓
Total Cyanide (CN)	mg/kg	M	< 1	✓
Total (mono) Phenols	mg/kg	M	< 2.0	✓
Elemental Sulphur (S)	mg/kg	M	< 20	✓
Acid Volatile Sulphide (S)	mg/kg	M	2.0	✓
Water Soluble Sulphate (SO_4)	g/l	M	0.98	✓
Naphthalene	mg/kg	M	< 0.05	✓
Acenaphthylene	mg/kg	M	< 0.20	✓
Acenaphthene	mg/kg	M	< 0.10	✓
Fluorene	mg/kg	M	< 0.20	✓
Phenanthrene	mg/kg	M	< 0.20	✓
Anthracene	mg/kg	M	< 0.10	✓
Fluoranthene	mg/kg	M	< 0.20	✓
Pyrene	mg/kg	M	< 0.20	✓
Benzo(a)anthracene	mg/kg	M	< 0.20	✓
Chrysene	mg/kg	M	< 0.05	✓
Benzo(b)fluoranthene	mg/kg	M	< 0.10	✓
Benzo(k)fluoranthene	mg/kg	M	< 0.20	✓
Benzo(a)pyrene	mg/kg	M	< 0.10	✓
Indeno(1,2,3-cd)pyrene	mg/kg	M	< 0.20	✓
Dibenzo(a,h)anthracene	mg/kg	M	< 0.20	✓
Benzo(g,h,i)perylene	mg/kg	M	< 0.05	✓
Total PAHs (sum USEPA16)	mg/kg	M	< 1.6	✓
Aliphatic TPH (C5-C6)	mg/kg	M	< 0.1	✓
Aliphatic TPH (C6-C8)	mg/kg	M	< 0.1	✓
Aliphatic TPH (C8-C10)	mg/kg	M	< 0.1	✓
Aliphatic TPH (C10-C12)	mg/kg	M	< 1.0	✓
Aliphatic TPH (C12-C16)	mg/kg	M	< 2.0	✓
Aliphatic TPH (C16-C21)	mg/kg	M	< 8.0	✓
Aliphatic TPH (C21-C35)	mg/kg	M	< 8.0	✓
Aliphatic TPH (C5-C35)	mg/kg	M	< 10	✓
Aromatic TPH (C5-C7)	mg/kg	M	< 0.1	✓
Aromatic TPH (C7-C8)	mg/kg	M	< 0.1	✓
Aromatic TPH (C8-C10)	mg/kg	M	< 0.1	✓
Aromatic TPH (C10-C12)	mg/kg	M	< 1.0	✓
Aromatic TPH (C12-C16)	mg/kg	M	< 2.0	✓
Aromatic TPH (C16-C21)	mg/kg	M	< 10	✓
Aromatic TPH (C21-C35)	mg/kg	M	< 10	✓
Aromatic TPH (C5-C35)	mg/kg	M	< 10	✓
Benzene	mg/kg	M	< 0.001	✓
Toluene	mg/kg	M	< 0.001	✓
Ethylbenzene	mg/kg	M	< 0.001	✓
o-xylene	mg/kg	M	< 0.001	✓
Asbestos	--	I	Absent	✓

Visual Examination

The sample was described as a dark greyish brown, dry, friable SANDY LOAM with a moderately developed fine to medium granular structure. The sample was stone-free and no deleterious materials, roots or rhizomes of pernicious weeds were observed.

✓	Meets General Landscape Specification
X	Fails General Landscape Specification
SL	Sandy Loam Texture Class
M	MCERTS accredited method (& UKAS accredited method)
I	ISO 17025 accredited method
U	UKAS accredited method
G	GLP accredited method

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