Declaration of Compliance BS3882:2015

Soil source: British Sugar TOPSOIL

This declaration confirms that the topsoil represented by the attached Topsoil Analysis Report conforms to the requirements of the British Standard for Topsoil (BS3882:2015).

The sample was sampled and tested in accordance with the requirements of BS3882:2015

- Samples are taken for analysis every 8000 tonnes (5000 m3) of product
- Samples are taken from all TOPSOIL products ready for despatch
- All products are sampled after screening
- Analysis certificates are retained for a period of 5 years

- Laboratory analysis is undertaken at a **UKAS** and **MCERTS** accredited laboratory
- All laboratory methods are in accordance with BS3882:2015
- All British Sugar TOPSOIL products are produced to a **Quality Management System** approved by Lloyd's Register Quality Assurance to **ISO 9001:2008** standard

Signed

Andy Spetch
British Sugar TOPSOIL, National TOPSOIL Manager
Sugar Way, Peterborough, PE2 9AY
Telephone 0870 2402314

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

British Sugar Topsoil

Mr Andy Spetch
British Sugar plc Co-Products
Oundle Road
Peterborough
PE2 9QU

26th November 2018
Our Ref: TOHA/18/7846/SS
Your Ref: PO 60075861

Dear Sirs

Topsoil Analysis Report: Newark L20

We have completed the analysis of the LANDSCAPE 20 TOPSOIL sample recently submitted, referenced *Nwk L20-Nov18* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the LANDSCAPE 20 TOPSOIL sample for general landscape purposes. 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* – 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 or waste designation purposes, especially after the topsoil has left the British Sugar factory.

SAMPLE EXAMINATION

The sample was described as a dark brown (Munsell Colour 10YR 3/3), slightly moist, friable, moderately calcareous SANDY LOAM with a weakly developed, very fine to medium granular structure*. The sample was virtually stone-free and 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. Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

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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:

- particle size analysis (sand, 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, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn);
- 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 LANDSCAPE 20 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 satisfactory.

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 8.2). 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 (3300 µS/cm) given in *BS3882:2015 – Table 1*.

Organic Matter and Fertility Status

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

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

British Sugar Topsoil

Potential Contaminants

With reference to *BS3882:2015* - Table 1: Notes 3 and 4, there is a recommendation 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 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 for Assessment of Land Affected by Contamination – Policy Companion Document* (2014). The concentration of barium has been compared with the *residential* land use given in the document *EIC/AGS/CL:AIRE Soil Generic Assessment Criteria for Human Health Risk Assessment* (2010).

Of the 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 LANDSCAPE 20 TOPSOIL sample for general landscape purposes.

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, moderately calcareous sandy loam with a weak structure and low stone content. The sample was well supplied with 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 LANDSCAPE 20 TOPSOIL represented by this sample would be considered suitable for general landscape purposes (trees, shrubs and amenity grass), provided species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding and the soil's physical condition is satisfactory.

The topsoil was also fully compliant with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil - 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.

Further details on soil handling are provided in Annex A of *BS3882:2015.*

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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





Aaron Cross
BSc
Graduate Soil Scientist

Ceri Spears
BSc MSc MISoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

British Sugar Topsoil

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**British Sugar plc Co-Products**
Client Ref:	**Newark**
Job:	**Topsoil Analysis**
Date:	**26/11/2018**
Job Ref No:	**TOHA/18/7846/SS**

Sample Reference			**Nwk-L20-Nov18**	
Clay (<0.002mm)	%	U	14	✓
Silt (0.002-0.063mm)	%	U	20	✓
Sand (0.063-2.0mm)	%	U	66	✓
Texture Class (UK Classification)	--	U	SL	--
Stones (2-20mm)	% DW	G	1	✓
Stones (20-50mm)	% DW	G	0	✓
Stones (>50mm)	% DW	G	0	✓
pH Value (1:2.5 water extract)	units	G	8.2	✓
Electrical Conductivity (1:2.5 water extract)	uS/cm	U	1105	✓
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	U	2878	✓
Exchangeable Sodium Percentage	%	U	5.6	✓
Moisture Content	%	U	16	--
Organic Matter (LOI)	%	U	6.0	✓
Total Nitrogen (Dumas)	%	U	0.28	✓
C : N Ratio	:1	U	12	✓
Extractable Phosphorus	mg/l	U	53	✓
Extractable Potassium	mg/l	U	1174	✓
Extractable Magnesium	mg/l	U	194	✓
Total Arsenic (As)	mg/kg	M	11	✓
Total Barium (Ba)	mg/kg	M	80	✓
Total Beryllium (Be)	mg/kg	M	0.58	✓
Total Cadmium (Cd)	mg/kg	M	0.3	✓
Total Chromium (Cr)	mg/kg	M	24	✓
Hexavalent Chromium (Cr VI)	mg/kg	M	< 4.0	✓
Total Copper (Cu)	mg/kg	M	15	✓
Total Lead (Pb)	mg/kg	M	33	✓
Total Mercury (Hg)	mg/kg	M	< 0.3	✓
Total Nickel (Ni)	mg/kg	M	15	✓
Total Selenium (Se)	mg/kg	M	3.2	✓
Total Vanadium (V)	mg/kg	M	32	✓
Total Zinc (Zn)	mg/kg	M	61	✓
Water Soluble Boron (B)	mg/kg	M	2.8	✓
Total Cyanide (CN)	mg/kg	M	< 1	✓
Total (mono) Phenols	mg/kg	M	< 1.0	✓
Naphthalene	mg/kg	M	< 0.05	✓
Acenaphthylene	mg/kg	M	< 0.05	✓
Acenaphthene	mg/kg	M	< 0.05	✓
Fluorene	mg/kg	M	< 0.05	✓
Phenanthrene	mg/kg	M	< 0.05	✓
Anthracene	mg/kg	M	< 0.05	✓
Fluoranthene	mg/kg	M	< 0.05	✓
Pyrene	mg/kg	M	< 0.05	✓
Benzo(a)anthracene	mg/kg	M	< 0.05	✓
Chrysene	mg/kg	M	< 0.05	✓
Benzo(b)fluoranthene	mg/kg	M	< 0.05	✓
Benzo(k)fluoranthene	mg/kg	M	< 0.05	✓
Benzo(a)pyrene	mg/kg	M	< 0.05	✓
Indeno(1,2,3-cd)pyrene	mg/kg	M	< 0.05	✓
Dibenzo(a,h)anthracene	mg/kg	M	< 0.05	✓
Benzo(g,h,i)perylene	mg/kg	M	< 0.05	✓
Total PAHs (sum USEPA16)	mg/kg	M	< 0.80	✓
Aliphatic TPH (C5-C6)	mg/kg	M	< 0.001	✓
Aliphatic TPH (C6-C8)	mg/kg	M	< 0.001	✓
Aliphatic TPH (C8-C10)	mg/kg	M	< 0.001	✓
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	27	✓
Aliphatic TPH (C5-C35)	mg/kg	M	27	✓
Aromatic TPH (C5-C7)	mg/kg	M	< 0.001	✓
Aromatic TPH (C7-C8)	mg/kg	M	< 0.001	✓
Aromatic TPH (C8-C10)	mg/kg	M	< 0.001	✓
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	22	✓
Aromatic TPH (C21-C35)	mg/kg	M	54	✓
Aromatic TPH (C5-C35)	mg/kg	M	76	✓
Benzene	mg/kg	M	< 0.001	✓
Toluene	mg/kg	M	< 0.001	✓
Ethylbenzene	mg/kg	M	< 0.001	✓
p & m-xylene	mg/kg	M	< 0.001	✓
o-xylene	mg/kg	M	< 0.001	✓
Asbestos	ND/D	I	Not-detected	✓

Visual Examination

The sample was described as a dark brown (Munsell Colour 10YR 3/3), slightly moist, friable, moderately calcareous SANDY LOAM with a weakly developed, very fine to medium granular structure. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

✓	Meets General Landscape Specification
X	Fails General Landscape Specification
*	See Report Comments
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

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, especially after the topsoil has left the British Sugar factory.

Aaron Cross
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British Sugar Topsoil