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Our Ref: TOHA/20/9523/2/SS
Your Ref: see below

Dear Sirs

Topsoil Analysis Report: Bury Hill Ericaceous Topsoil

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

The purpose of the analysis was to determine the suitability of the sample for use as an ericaceous topsoil for calcifuge planting. 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, Specific Purpose Topsoil - Acidic*).

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 very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable, non-calcareous SANDY LOAM with a weakly developed, very fine granular structure*. The sample was moderately stony and contained a moderate proportion of organic fines. 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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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;
- 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 *sandy loam* texture class. Further detailed particle size analysis revealed the sample to have a broad particle size distribution, with relatively equal proportions of four of the five sand fractions. This could increase the risk of particle interpacking once the material is placed or cultivated. In this situation, finer particles fill the voids between the larger particles, thereby reducing drainage and aeration. To minimise the impact of this, we recommend placing this soil to a maximum depth of 300mm, which is in line with *BS3882:2015*, section A.3.

The stone content of the sample was moderate, with all stones in the 2-20mm size range. As such, stones are unlikely to constitute a limitation for landscape purposes.

pH and Electrical Conductivity Values

The sample was strongly acid in reaction (pH 5.4), with a pH value that would be considered ideal for acid-loving species (calcifuges).

The electrical conductivity (salinity) value (water extract) was low, which indicates that soluble salts were not present at levels that would be harmful to plants.

The electrical conductivity value by CaSO₄ 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 adequately supplied with organic matter and all major plant nutrients.

The C:N ratio was slightly high (22:1) and exceeded the maximum upper limit set by *BS3882:2015* - *Table 1* (20:1). This could cause 'nitrogen lock up' and result in growth restriction in sensitive plants in particular. The elevated C:N ratio may be addressed by a routine fertiliser application.

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 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 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 sample for use as an ericaceous topsoil for calcifuge planting. 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, Specific Purpose Topsoil - Acidic*).

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly acid, non-saline, non-calcareous sandy loam, with a weak structure and moderate stone content. The sample contained sufficient reserves of organic matter and all major plant nutrients. The C:N ratio was slightly high. 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 ericaceous planting, provided the following conditions are met:

- the high C:N ratio is addressed by a routine fertiliser application;
- the soil's physical condition is satisfactory;
- the topsoil is placed to a maximum depth of **300mm**.

The sample was largely compliant with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil – Table 1, Specific Purpose Topsoil - Acidic*), with the exception of the high C:N ratio. On this occasion, this non-compliance is considered minor when reviewed in the context of all the other results, provided the C:N ratio is remedied by a routine fertiliser application prior to planting.

RECOMMENDATIONS

Fertiliser for Planting

To reduce the C:N ratio and to help promote effective plant establishment, we recommend applying and incorporating the compound, controlled release fertiliser *ICL Osmocote PrePlant* (17%N:9%P₂O₅:10%K₂O:2%MgO+TE) at a rate of 70 g/m² for planting beds and/or 180 g/tree pit, and to a depth of 200mm.

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, resspreading, 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



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For & on behalf of *Tim O'Hare Associates LLP*

