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Our Ref: TOHA/21/7191/3/SS  
Your Ref: PO 77955

Dear Sirs

**Soil Analysis Report: Lawn Rootzone**

We have completed the analysis of the sample recently submitted, referenced *Lawn Rootzone*, and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as a lawn rootzone for high-use amenity grass areas.

This report presents the results of analysis for the sample submitted to our office, and it should be considered 'indicative' of the rootzone 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 material has left the Bourne Amenity Ltd site.

**SAMPLE EXAMINATION**

The sample was described as a brown (Munsell Colour 7.5YR 4/2), slightly moist, friable, non-calcareous SAND with a single grain structure\*. The sample was virtually stone-free and contained a low 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. 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, drainage rate and fertility of the rootzone, 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;
- visible contaminants (>2mm);
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water-soluble sulphate;
- 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**

The sample fell into the *sand* texture class. Further detailed particle size analysis revealed the sample to have a narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm) and smaller proportions of *fine sand* (0.15-0.25mm) and *coarse sand* (0.50-1.0mm).

This texture class would be considered acceptable for amenity grass areas receiving high amounts of foot traffic as the high sand content and narrow overall grading will facilitate a higher wear tolerance. This is on the proviso that the recipient lawn area is to be constructed with an automatic 'pop up' irrigation and is to receive regular fertiliser inputs to mitigate the reduced water and nutrient holding capacity of high sand content material. Use of a suitable soil conditioner is also recommended (see 'Recommendations' below).

Given its high sand content, this material would not be considered suitable for lawns that will not be irrigated.

### **Stone Content**

The sample was virtually stone-free and as such, stones would not restrict the use of the soil for amenity grass end-uses.

### **Saturated Hydraulic Conductivity**

The saturated hydraulic conductivity rate (222mm/hr) is high and correlates well with the narrow particle size distribution of the rootzone. This would be considered suitable for high-permeability landscape environments, such as high-performance lawns, but may be considered too high for lawns where irrigation is not available during the summer months.

### **pH and Electrical Conductivity Values**

The sample was strongly alkaline in reaction (pH 8.6); however the calcium carbonate (lime) content was found to be very low (<1.0%). The alkalinity in this instance is likely to be due to the low buffering capacity of high sand content material and influence of other ions such as potassium rather than from lime. Therefore, this pH value that would be considered suitable for a range of grass species used within amenity grass lawns.

The electrical conductivity (salinity) values (water and CaSO<sub>4</sub> extracts) were low, which indicates that soluble salts were not present at levels that would be harmful to plants.

### **Organic Matter and Fertility Status**

The sample was adequately supplied with organic matter in relation to use for amenity grass establishment. The levels of major plant nutrients were moderate to low, in which case it would be beneficial to supplement these with suitable applications of fertiliser during ongoing maintenance of the recipient lawn area, particularly given the high sand content of the material. Nutrient retention can be supported in the longer term by application of a suitable soil conditioner (see 'Recommendations' below).

The C:N ratio of the sample was acceptable for lawn establishment.

### **Potential Contaminants**

In the absence of site-specific assessment criteria, the concentrations of potential contaminants 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 a lawn rootzone for high-use amenity grass areas.

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, non-calcareous, sand with a single grain structure and very low stone content. The sample was adequately supplied with organic matter, with moderate reserves of major plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

Based on our findings, the rootzone represented by this sample would be considered suitable for high-performance amenity grass lawns in schemes where a free-draining and/or compaction resistant 'topsoil' is required, and where adequate irrigation is provided. An appropriate fertiliser regime should be implemented during ongoing maintenance of the lawn area.

### **RECOMMENDATIONS**

#### **Soil Conditioner**

The water and nutrient retention capacities of this rootzone could be improved by an application of the soil conditioner *TerraCottem "Universal"* just prior to turfing or seeding (<https://www.inturf.com/terracottem/terracottem-universal/>).

#### **Handling Recommendations**

It is important to ensure that the rootzone is not unnecessarily compacted by trampling or trafficking by site machinery. If over compacted at any stage during the course of soiling or landscaping works, it should be treated appropriately to relieve the compaction.

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

