



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

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27th September 2021
Our Ref: TOHA/21/7134/SS
Your Ref: IE11489

Dear Sirs

Topsoil Analysis Report: London Lawn Topsoil (08/09/21)

We have completed the analysis of the soil sample recently submitted, referenced *London Lawn Topsoil (08/09/21)* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes, including residential gardens. 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 London Lawn Turf Co Ltd site.

SAMPLE EXAMINATION

The sample was described as a very dark greyish brown (Munsell Colour 10YR 3/2), dry, friable, slightly calcareous SANDY LOAM with a single grain structure*. The sample was virtually stone-free 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:

- 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, B, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn);
- 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, 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 8.4). 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 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 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 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 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 – Table 1, Multipurpose Topsoil*).

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, slightly calcareous sandy loam with a single grain structure and very 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 topsoil represented by this sample would be considered suitable for general landscape purposes, including residential gardens, provided species with a wide pH tolerance or those known to prefer alkaline soils are selected and the physical condition of the soil is satisfactory.

The sample was 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, 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.

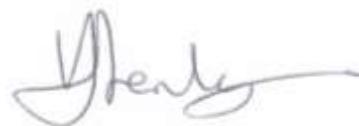
Further details on soil handling are provided in Annex A of *BS3882:2015*.

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



Tilly Kimble-Wilde
BSc MSc
Graduate Soil Scientist



Helen Stanley
BSc MSc MISOilSci CSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP



| | |
|-------------|---------------------------------|
| Client: | The London Lawn Turf Co Limited |
| Project: | London Lawn Topsoil (08/09/21) |
| Job: | Topsoil Analysis - BS3882:2015 |
| Date: | 27/09/2021 |
| Job Ref No: | TOHA/21/7134/SS |

| Sample Reference | | |
|-----------------------------------|------|---------------|
| | | Accreditation |
| Clay (<0.002mm) | % | UKAS |
| Silt (0.002-0.063mm) | % | UKAS |
| Sand (0.063-2.0mm) | % | UKAS |
| Texture Class (UK Classification) | -- | UKAS |
| Stones (2-20mm) | % DW | GLP |
| Stones (20-50mm) | % DW | GLP |
| Stones (>50mm) | % DW | GLP |

**London Lawn Topsoil
(08/09/21)**

| | |
|----|----|
| 11 | ✓ |
| 15 | ✓ |
| 74 | ✓ |
| SL | -- |
| 2 | ✓ |
| 0 | ✓ |
| 0 | ✓ |

| | | |
|---|-------|------|
| pH Value (1:2.5 water extract) | units | UKAS |
| Electrical Conductivity (1:2.5 water extract) | uS/cm | UKAS |
| Electrical Conductivity (1:2 CaSO ₄ extract) | uS/cm | UKAS |
| Exchangeable Sodium Percentage | % | UKAS |
| Organic Matter (LOI) | % | UKAS |
| Total Nitrogen (Dumas) | % | UKAS |
| C:N Ratio | ratio | UKAS |
| Extractable Phosphorus | mg/l | UKAS |
| Extractable Potassium | mg/l | UKAS |
| Extractable Magnesium | mg/l | UKAS |

| | |
|------|---|
| 8.4 | ✓ |
| 1228 | ✓ |
| 3132 | ✓ |
| 3.8 | ✓ |
| 10.5 | ✓ |
| 0.43 | ✓ |
| 14 | ✓ |
| 60 | ✓ |
| 1409 | ✓ |
| 155 | ✓ |

| | | |
|-----------------------------|-------|--------|
| Total Arsenic (As) | mg/kg | MCERTS |
| Total Barium (Ba) | mg/kg | MCERTS |
| Total Beryllium (Be) | mg/kg | MCERTS |
| Total Cadmium (Cd) | mg/kg | MCERTS |
| Total Chromium (Cr) | mg/kg | MCERTS |
| Hexavalent Chromium (Cr VI) | mg/kg | MCERTS |
| Total Copper (Cu) | mg/kg | MCERTS |
| Total Lead (Pb) | mg/kg | MCERTS |
| Total Mercury (Hg) | mg/kg | MCERTS |
| Total Nickel (Ni) | mg/kg | MCERTS |
| Total Selenium (Se) | mg/kg | MCERTS |
| Total Vanadium (V) | mg/kg | MCERTS |
| Total Zinc (Zn) | mg/kg | MCERTS |
| Water Soluble Boron (B) | mg/kg | MCERTS |
| Total Cyanide (CN) | mg/kg | MCERTS |
| Total (mono) Phenols | mg/kg | MCERTS |

| | |
|-------|---|
| 7 | ✓ |
| 130 | ✓ |
| 0.47 | ✓ |
| 0.3 | ✓ |
| 64 | ✓ |
| < 4.0 | ✓ |
| 28 | ✓ |
| 39 | ✓ |
| < 0.3 | ✓ |
| 13 | ✓ |
| < 1.0 | ✓ |
| 18 | ✓ |
| 76 | ✓ |
| 1.8 | ✓ |
| < 1.0 | ✓ |
| < 1.0 | ✓ |

| | | |
|--------------------------|-------|--------|
| Naphthalene | mg/kg | MCERTS |
| Acenaphthylene | mg/kg | MCERTS |
| Acenaphthene | mg/kg | MCERTS |
| Fluorene | mg/kg | MCERTS |
| Phenanthrene | mg/kg | MCERTS |
| Anthracene | mg/kg | MCERTS |
| Fluoranthene | mg/kg | MCERTS |
| Pyrene | mg/kg | MCERTS |
| Benzo(a)anthracene | mg/kg | MCERTS |
| Chrysene | mg/kg | MCERTS |
| Benzo(b)fluoranthene | mg/kg | MCERTS |
| Benzo(k)fluoranthene | mg/kg | MCERTS |
| Benzo(a)pyrene | mg/kg | MCERTS |
| Indeno(1,2,3-cd)pyrene | mg/kg | MCERTS |
| Dibenzo(a,h)anthracene | mg/kg | MCERTS |
| Benzo(g,h,i)perylene | mg/kg | MCERTS |
| Total PAHs (sum USEPA16) | mg/kg | MCERTS |

| | |
|--------|---|
| < 0.05 | ✓ |
| < 0.05 | ✓ |
| < 0.05 | ✓ |
| < 0.05 | ✓ |
| < 0.05 | ✓ |
| < 0.05 | ✓ |
| 0.42 | ✓ |
| 0.36 | ✓ |
| 0.33 | ✓ |
| 0.26 | ✓ |
| 0.33 | ✓ |
| 0.18 | ✓ |
| 0.29 | ✓ |
| < 0.05 | ✓ |
| < 0.05 | ✓ |
| < 0.05 | ✓ |
| < 0.05 | ✓ |
| 2.17 | ✓ |

| | | |
|-------------------------|-------|--------|
| Aliphatic TPH (C5-C6) | mg/kg | MCERTS |
| Aliphatic TPH (C6-C8) | mg/kg | MCERTS |
| Aliphatic TPH (C8-C10) | mg/kg | MCERTS |
| Aliphatic TPH (C10-C12) | mg/kg | MCERTS |
| Aliphatic TPH (C12-C16) | mg/kg | MCERTS |
| Aliphatic TPH (C16-C21) | mg/kg | MCERTS |
| Aliphatic TPH (C21-C35) | mg/kg | MCERTS |
| Aliphatic TPH (C5-C35) | mg/kg | MCERTS |
| Aromatic TPH (C5-C7) | mg/kg | MCERTS |
| Aromatic TPH (C7-C8) | mg/kg | MCERTS |
| Aromatic TPH (C8-C10) | mg/kg | MCERTS |
| Aromatic TPH (C10-C12) | mg/kg | MCERTS |
| Aromatic TPH (C12-C16) | mg/kg | MCERTS |
| Aromatic TPH (C16-C21) | mg/kg | MCERTS |
| Aromatic TPH (C21-C35) | mg/kg | MCERTS |
| Aromatic TPH (C5-C35) | mg/kg | MCERTS |

| | |
|---------|---|
| < 0.001 | ✓ |
| < 0.001 | ✓ |
| < 0.001 | ✓ |
| < 1.0 | ✓ |
| < 2.0 | ✓ |
| < 8.0 | ✓ |
| 19 | ✓ |
| 22 | ✓ |
| < 0.001 | ✓ |
| < 0.001 | ✓ |
| < 0.001 | ✓ |
| < 1.0 | ✓ |
| < 2.0 | ✓ |
| < 10 | ✓ |
| < 10 | ✓ |
| < 10 | ✓ |

| | | |
|------------------------------------|-------|--------|
| Benzene | mg/kg | MCERTS |
| Toluene | mg/kg | MCERTS |
| Ethylbenzene | mg/kg | MCERTS |
| p & m-xylene | mg/kg | MCERTS |
| o-xylene | mg/kg | MCERTS |
| MTBE (Methyl Tertiary Butyl Ether) | mg/kg | MCERTS |

| | |
|---------|---|
| < 0.001 | ✓ |
| < 0.001 | ✓ |
| < 0.001 | ✓ |
| < 0.001 | ✓ |
| < 0.001 | ✓ |
| < 0.001 | ✓ |

| | | |
|-----------------|------|----------|
| Asbestos Screen | ND/D | ISO17025 |
|-----------------|------|----------|

| | |
|--------------|---|
| Not-detected | ✓ |
|--------------|---|

Visual Examination

The sample was described as a very dark greyish brown (Munsell Colour 10YR 3/2), dry, friable, slightly calcareous SANDY LOAM with a single grain structure. The sample was virtually stone-free and contained a moderate proportion of organic fines. 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 |
| PAH | Polycyclic Aromatic Hydrocarbons |

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

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