



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

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Our Ref: TOHA/23/7882/1/SS
Your Ref: see below

Dear Sirs

Subsoil Analysis Report: Bury Hill Horsham Yard – Washed Lightweight Subsoil (R)

We have completed the analysis of the soil sample recently submitted, referenced *Washed Lightweight Subsoil (R)* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the material for use as a lightweight subsoil in a rooftop or podium garden environment.

This report presents the results of analysis for the sample submitted to our office, and it should be considered 'indicative' of the soil source. The report and results should therefore not be used by third parties as a means of verification or validation testing, waste designation purposes, or for any project-specific applications, especially after the soil has left the Bury Hill Landscape Supplies Ltd site.

SAMPLE EXAMINATION

The sample can be described as a yellow (Munsell Colour, 10YR 8/8), slightly moist, friable, non-calcareous SAND with a single grained structure. The sample was stone free and contained a proportion of lightweight expanded clay aggregate 'leca'. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

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Plate 1: Washed Lightweight Subsoil (R)

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 of the soil. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-75mm, >75mm);
- saturated hydraulic conductivity;
- bulk density (as received, saturated at field capacity);
- pH and electrical conductivity (1:2.5 water extract);
- exchangeable sodium percentage
- calcium carbonate.
- organic matter content;
- visible contaminants;
- heavy metals (Sb, 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 & Stone Content

The sample fell into the *sand* texture class and would be described as light in texture. 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 *coarse sand* (0.50-1.0mm). This is acceptable for subsoil for podium or roof garden environments as porosity levels are maintained under a degree of consolidation and the risk of particle interpacking is minimised.

With the exception of 'leca' particles, the sample was stone free and as such, stones should not restrict the use of the soil.

Bulk Density and Saturated Hydraulic Conductivity

The sample displayed a bulk density at Field Capacity of 1.65 Mg/m³, which is reasonably low compared to that of standard subsoil. The suitability of the bulk density result should be confirmed by the project engineer for the recipient site.

The saturated hydraulic conductivity of the sample was very high (914mm/hour) and would be described as 'free-draining'. The appropriateness of this drainage rate will depend on the specifics of any particular roof garden design (e.g. overall soil depths, topsoil media performance, plant species selection, irrigation provision, environmental conditions).

pH and Electrical Conductivity Values

The sample was slightly alkaline in reaction (pH 7.4) with a low calcium carbonate (lime) content. Therefore, this pH value should not significantly restrict species selection for general landscape purposes.

The electrical conductivity (salinity) values (water and CaSO₄ extracts) were low, which indicates that soluble salts were not present at levels that would be harmful to plants.

Organic Matter Content

The organic matter content was low (<0.5%).

Potential Contaminants

In the absence of site-specific assessment criteria, the concentrations of selected potential contaminants that affect human health have been assessed for the concentrations that affect human health have been assessed for *residential* end-use against 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).

Of the potential contaminants determined, none exceeded their respective guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded their guideline values.

CONCLUSION

The purpose of the analysis was to determine the suitability of the material for use as a lightweight subsoil for landscaping purposes in a podium or rooftop garden environment.

From the soil examination and subsequent laboratory analysis, the soil represented by this sample was described as a slightly alkaline, non-saline, non-calcareous sand with a single grain structure. The sample was stone free and contained a proportion of 'leca'. The saturated hydraulic conductivity value was very high and the organic matter content was low. Of the potential contaminants determined, none exceeded their respective guideline values.

Based on our findings, the substrate represented by this sample should be suitable for use as a lightweight subsoil in a roof garden environment where a free-draining subsoil is required. The suitability of the bulk density and saturated hydraulic conductivity results should be confirmed by the project engineer and landscape designer.

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.

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

