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31<sup>st</sup> October 2022  
Our Ref: TOHA/22/7714/1/SS  
Your Ref: see below

Dear Sirs

**Subsoil Analysis Report: Bury Hill Horsham Yard - Washed Tree Pit Subsoil**

We have completed the analysis of the soil sample recently submitted, referenced *Washed Tree Pit Subsoil*, and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as a 'structural subsoil' for tree planting in hard landscape situations.

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

**SAMPLE EXAMINATION**

The sample was described as a yellow (Munsell Colour 2.5Y 7/6), slightly moist, friable, non-calcareous SAND with a single grain 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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Plate 1: Washed Tree Pit Subsoil Sample

### **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, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-75mm, >75mm);
- bulk density (saturated at field capacity);
- saturated hydraulic conductivity;
- pH and electrical conductivity values;
- exchangeable sodium percentage;
- organic matter content;
- heavy metals (As, B, Cd, Cr, Cu, Pb, Hg, Ni, Se, 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 *sand* texture class. The grading of the sand indicates a sufficiently narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm), followed by *coarse sand* (0.50-1.0mm). This is ideal for 'structural soils' as sufficient porosity levels are maintained in a compacted state and the risk of particle interpacking is minimised.

The sample was virtually stone free and as such, stones should not restrict the use of the sand for landscape purposes.

### **Saturated Hydraulic Conductivity and Bulk Density**

The permeability of the sample when in a compacted state (Standard Compaction) was high (972mm/hr) and indicates that the sand would demonstrate satisfactory drainage performance for tree planting in hard landscape situations.

The sample displayed a bulk density when compacted at Field Capacity of 1.7 Mg/m<sup>3</sup>. The suitability of the bulk density result should be confirmed by the project engineer for the recipient site.

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

The sample was slightly acid in reaction (pH 6.5), with a pH value that would be considered ideal for subsoil in general landscape applications.

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 Content**

The sample contained a low organic matter content (<0.5%), which is appropriate for 'structural subsoil' material.

### **Potential Contaminants**

With reference to *BS8601:2013 – Section 4.2: Note 2*, there is a recommendation to confirm levels of potential contaminants in relation to the subsoil'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 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 the maximum permissible levels specified in *BS8601:2013 – Table 1*.

## CONCLUSION

The purpose of the analysis was to determine the suitability of the sample for use as a 'structural subsoil' for tree planting in hard landscape situations.

From the soil examination and subsequent laboratory analysis, the sample was described as a slightly acid, non-saline, non-calcareous, stone-free sand with a single grain structure. The organic matter content was low and consistent with subsoil. The permeability rate of the sample was high. Of the potential contaminants determined, none exceeded their respective guideline values.

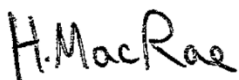
Based on our findings, the sand represented by this sample would be considered suitable for use as a 'structural subsoil' for tree planting in hard landscape situations.

The need for any further geotechnical tests in relation to use of the material as a load bearing substrate should be confirmed by the engineer for the recipient site as necessary.

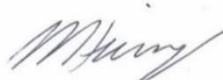
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We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully



**Harriet MacRae**  
BSc MSc  
Graduate Soil Scientist



**Matthew Heins**  
BSc (Hons) MSoilSci  
Senior Soil Scientist

For & on behalf of Tim O'Hare Associates LLP



Client:	Bury Hill Landscape Supplies Ltd
Project:	Bury Hill Horsham Yard - Washed Tree Pit Subsoil
Job:	Subsoil Analysis - BS8601:2013
Date:	31/10/2022
Job Ref No:	TOHA/22/7724/1/SS

Sample Reference		Accreditation
Clay (<0.002mm)	%	UKAS
Silt (0.002-0.05mm)	%	UKAS
Very Fine Sand (0.05-0.15mm)	%	UKAS
Fine Sand (0.15-0.25mm)	%	UKAS
Medium Sand (0.25-0.50mm)	%	UKAS
Coarse Sand (0.50-1.0mm)	%	UKAS
Very Coarse Sand (1.0-2.0mm)	%	UKAS
Total Sand (0.05-2.0mm)	%	UKAS
Texture Class (UK Classification)	--	UKAS
Stones (2-20mm)	% DW	GLP
Stones (20-75mm)	% DW	GLP
Stones (>75mm)	% DW	GLP

Washed Tree Pit Subsoil
2
0
3
9
62
22
2
98
5
0
0
0

Bulk Density ( Field Capacity)	Mg/m3	UKAS
Saturated Hydraulic Conductivity	mm/hr	A2LA

1.7
972

pH Value (1:2.5 water extract)	units	UKAS
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS
Electrical Conductivity (1:2 CaSO <sub>4</sub> extract)	uS/cm	UKAS
Exchangeable Sodium Percentage	%	UKAS
Organic Matter (LOI)	%	UKAS

6.5
60
2016
4.4
<0.5

Total Arsenic (As)	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 Zinc (Zn)	mg/kg	MCERTS
Water Soluble Boron (B)	mg/kg	MCERTS
Total Cyanide (CN)	mg/kg	MCERTS
Total (mono) Phenols	mg/kg	MCERTS

3.6
< 0.2
4.3
< 1.8
2
< 1.0
< 0.3
< 1.0
< 1.0
2.6
< 0.2
< 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(a,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
< 0.05
< 0.05
< 0.05
< 0.05
< 0.05
< 0.05
< 0.05
< 0.05
< 0.05
< 0.05
< 0.05
< 0.05
< 0.05
< 0.05
< 0.80

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
< 8.0
< 10
< 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
o-xylene	mg/kg	MCERTS
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS

< 0.001
< 0.001
< 0.001
< 0.001
< 0.001

Asbestos	ND/D	ISO 17025
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Not-detected
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S = SAND

**Visual Examination**

The sample was described as a yellow (Munsell Colour 2.5Y 7/6), slightly moist, friable, non-calcareous SAND with a single grain structure. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

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

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*H. MacRae*

**Harriet MacRae**  
BSc MSc  
Graduate Soil Scientist