TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr John Coles
Bury Hill Landscape Supplies Ltd
The Estate Office
Old Bury Hill
Westcott
Nr Dorking
Surrey, RH4 3JU

13th February 2023
Our Ref: TOHA/23/7802/3/SS
Your Ref: see below

Dear Sirs

Subsoil Analysis Report: Bury Hill Horsham Yard - Washed Tree Pit Subsoil (R)

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

The purpose of the analysis was to determine the suitability of the sample for use as a free-draining 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, or for any project-specific applications, especially after the subsoil has left the Bury Hill Landscape Supplies Ltd site.

SAMPLE EXAMINATION

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

Plate 1: Washed Tree Pit Subsoil (R) 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;
- calcium carbonate content;
- 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 and Stone Content

The sample fell into the *sand* texture class. The grading of the sand indicates a narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm), followed by a smaller proportion of *coarse sand* (0.50-1.0mm). As such, the soil should maintain sufficient porosity levels in a compacted state and the risk of particle interpacking is minimised.

The sample was 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 very high (1028mm/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 1.57 Mg/m^3. 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 acid in reaction (pH 6.7), with a low calcium carbonate (lime) content. This pH value should not restrict the use of the soil for most plant species.

The electrical conductivity (salinity) values (water and $CaSO_4$ 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 suitable for a subsoil.

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 the maximum recommended levels.

CONCLUSION

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

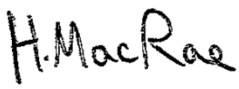
From the soil examination and subsequent laboratory analysis, the sample was described as a slightly acid, non-saline, non-calcareous sand with a single grain structure. The sample was stone free and the organic matter content was low and consistent with subsoil. The permeability rate of the sample was very 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 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.

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) MISoilSci
Senior Soil Scientist

For & on behalf of Tim O'Hare Associates LLP

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bury Hill Landscape Supplies Ltd**
Project:	**Bury Hill Horsham Yard - Washed Tree Pit Subsoil**
Job:	**Subsoil Analysis**
Date:	**13/02/2023**
Job Ref No:	**TOHA/23/7802/3/SS**

Sample Reference			**Washed Tree Pit Subsoil (R)**
		Accreditation	
Clay (<0.002mm)	%	UKAS	0
Silt (0.002-0.05mm)	%	UKAS	1
Very Fine Sand (0.05-0.15mm)	%	UKAS	0
Fine Sand (0.15-0.25mm)	%	UKAS	6
Medium Sand (0.25-0.50mm)	%	UKAS	56
Coarse Sand (0.50-1.0mm)	%	UKAS	35
Very Coarse Sand (1.0-2.0mm)	%	UKAS	2
Total Sand (0.05-2.0mm)	%	UKAS	99
Texture Class (UK Classification)	--	UKAS	S
Stones (2-20mm)	% DW	GLP	0
Stones (20-75mm)	% DW	GLP	0
Stones (>75mm)	% DW	GLP	0
Bulk Density (Field Capacity)	Mg/m3	UKAS	1.57
Saturated Hydraulic Conductivity	mm/hr	A2LA	1028
pH Value (1:2.5 water extract)	units	UKAS	6.7
Calcium Carbonate	%	UKAS	< 1.0
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	61
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2131
Exchangeable Sodium Percentage	%	UKAS	1.1
Organic Matter (LOI)	%	UKAS	<0.5
Visible Contaminants: Plastics >2.00mm	%	UKAS	0
Visible Contaminants: Sharps >2.00mm	%	UKAS	0
Total Antimony (Sb)	mg/kg	MCERTS	<1.0
Total Arsenic (As)	mg/kg	MCERTS	3.3
Total Barium (Ba)	mg/kg	MCERTS	1.1
Total Beryllium (Be)	mg/kg	MCERTS	< 0.06
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	3
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 1.8
Total Copper (Cu)	mg/kg	MCERTS	1.4
Total Lead (Pb)	mg/kg	MCERTS	< 1.0
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	1
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	4.6
Total Zinc (Zn)	mg/kg	MCERTS	3
Water Soluble Boron (B)	mg/kg	MCERTS	< 0.2
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	< 0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benz(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.005
Toluene	mg/kg	MCERTS	< 0.005
Ethylbenzene	mg/kg	MCERTS	< 0.005
p & m-xylene	mg/kg	MCERTS	< 0.005
o-xylene	mg/kg	MCERTS	< 0.005
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.005
Asbestos	D/ND	ISO 17025	Not-detected

S = SAND

Visual Examination

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

H.MacRae

Harriet MacRae
BSc MSc
Graduate Soil Scientist

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