TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Wright Landscapes

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25th July 2025
Our Ref: TOHA/25/1929/2/SS
Your Ref: PO 18387

Dear Sirs

Subsoil Analysis Report: Science and Industry Museum, Manchester

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

The purpose of the analysis was to determine the suitability of the sample for the proposed landscape scheme. In addition, the sample has been tested in accordance with the supplied Planit I.E. External Works Specification (*Science and Industry Museum – Upper Yard and Station Approach – Doc. Ref. 2913-PLA-XX-XX-SP-L-0004 - Rev. D4, C01 – 02.10.2024*), of which Clause 300A and 340A of the Q28 specification requires the subsoil to be tested in accordance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil).*

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 waste designation purposes.

SAMPLE EXAMINATION

The sample was described as a light yellowish brown (Munsell Colour 10YR 6/4), dry, non-plastic, non-calcareous, stone-free SAND with a single grain structure. No unusual odours or deleterious materials were observed.

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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:

- detailed particle size analysis (% 5 sands, silt, clay);
- stone content (2-20mm, 20-75mm, >75mm);
- 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

Detailed Particle Size Analysis and Stone Content

The sample fell into the *sand* texture class. Further detailed particle size analysis revealed the sample to have a very narrow particle size distribution with a large proportion of sand falling into the *fine sand* (0.15-0.25mm) class. This particular grading is considered ideal for this specific application of the subsoil.

The sample was stone-free and, as such, stones should not restrict the use of the soil for use as subsoil in general landscape purposes.

Saturated Hydraulic Conductivity

The saturated hydraulic conductivity result (167 mm/hr) recorded for the sample was high and indicates that the subsoil would be described as 'free-draining'.

pH and Electrical Conductivity Values

The sample was alkaline in reaction (pH 7.6). This pH value would be considered suitable for general landscape purposes provided that species with a wide pH tolerance or those known to prefer alkaline soils are selected.

The electrical conductivity (salinity) value (water extract) was very low, which indicates that soluble salts were not present at levels that would be harmful to plants.

The electrical conductivity value by CaSO4 extract (BS8601 requirement) fell below the maximum specified value (2800 µS/cm) given in *BS8601:2013 – Table 1*.

Organic Matter Content

The organic matter content was low (<0.5%) and compliant with *BS8601:2013 – Table 1*.

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Potential Contaminants

With reference to *BS8601:2013 – Section 4.2*: *Note 2*, there is a requirement 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 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 *BS8601:2013 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the sample for the proposed landscape scheme. In addition, the sample has been tested in accordance with the supplied Planit I.E. External Works Specification (*Science and Industry Museum – Upper Yard and Station Approach – Doc. Ref. 2913-PLA-XX-XX-SP-L-0004 - Rev. D4, C01 – 02.10.2024*), of which Clause 300A and 340A of the Q28 specification requires the subsoil to be tested in accordance with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil).*

From the soil examination and subsequent laboratory analysis, the sample was described as an alkaline, non-saline, non-calcareous, stone-free *sand* with a single grain structure and a high saturated hydraulic conductivity. The organic matter content was low and consistent with subsoil requirements. Of all the potential contaminants determined, none was found at levels that exceeded their guideline values.

To conclude, based on our findings, the subsoil represented by this sample would be considered suitable for the proposed landscape scheme provided the physical condition of the soil is satisfactory.

The sample was largely compliant with the requirements of the British Standard for Subsoil *(BS8601:2013 – Specification for subsoil and requirements for use – Table 1, Multipurpose Subsoil)* with the exception of the high total sand content. When reviewed in the context of all the other results and given the favourable grading of the sand, this is not regarded as a significant non-compliance for the proposed use of the subsoil.

Soil Handling Recommendations

Reference should be made to Section 6.0 of *BS8601:2013* with regard to the handling and management of the subsoil:

"Soils generally lose strength and become less resistant to damage as they become wetter; therefore, it is essential that they are stripped, handled and trafficked only in the appropriate conditions of weather and soil moisture, and with suitable machinery. If sustained heavy rainfall (e.g. >10 mm in 24 h) occurs during soil stripping operations, work should be suspended and not restarted until the ground has had at least one dry day or until a suitable moisture content has been reached. A soil can be considered to have a suitable moisture content for stripping and handling if the whole thickness of the subsoil layer being stripped and/or handled is at a moisture content below the plastic limit as determined in accordance with BS 1377-2:1990 (incorporating Amendment No. 1).

Machinery should be selected and routed to minimize soil compaction."

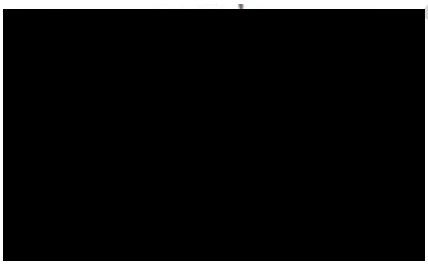
Further guidance is provided in Clauses 6.1–6.5.

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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





For & on behalf of Tim O'Hare Associates LLP

Wright Lands

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Wright Landscapes**
Project	**Science and Industry Museum, Manchester**
Job:	**Subsoil Analysis - BS8601:2013**
Date:	**25/07/2025**
Job Ref No:	**TOHA/25/1929/2/SS**

Sample Reference			**Eaton Hall Subsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	1
Silt (0.002-0.063mm)	%	UKAS	0
Very Fine Sand (0.063-0.15mm)	%	UKAS	23
Fine Sand (0.15-0.25mm)	%	UKAS	72
Medium Sand (0.25-0.50mm)	%	UKAS	4
Coarse Sand (0.50-1.0mm)	%	UKAS	0
Very Coarse Sand (1.0-2.0mm)	%	UKAS	0
Total Sand (0.063-2.0mm)	%	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
Saturated Hydraulic Conductivity	mm/hr	A2LA	167
pH Value (1:2.5 water extract)	units	UKAS	7.6
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	58
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2153
Organic Matter (LOI)	%	UKAS	<0.5
Exchangeable Sodium Percentage	%	UKAS	1.6
Total Arsenic (As)	mg/kg	MCERTS	< 1.0
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	2
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 1.8
Total Copper (Cu)	mg/kg	MCERTS	4
Total Lead (Pb)	mg/kg	MCERTS	< 1.0
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	2
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Zinc (Zn)	mg/kg	MCERTS	4
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
Benzo(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	< 0.010
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.010
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.010
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	< 0.010
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.010
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.020
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-oxylene	mg/kg	MCERTS	< 0.008
o-xylene	mg/kg	MCERTS	< 0.005
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.005
Asbestos	--	ISO 17025	Not-detected

S = SAND

Visual Examination

The sample was described as a light yellowish brown (Munsell Colour 10YR 6/4), dry, non-plastic, non-calcareous, stone-free SAND with a single grain structure. No unusual odours or deleterious materials were observed.

[redacted]

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

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