



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

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Crownhill Topsoil
The Old Heritage Brickworks
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Rogiet, NP26 3TF

21st November 2023
Our Ref: TOHA/23/1162/SS
Your Ref: as below

Dear Sirs

Topsoil Analysis Report: Caerwent

We have completed the analysis of the soil sample recently submitted, referenced *Caerwent Screened Topsoil* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes (trees, shrubs, amenity grass). 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 Crownhill Topsoil site.

SAMPLE EXAMINATION

The sample was described as a dark yellowish brown (Munsell Colour 10YR 3/6), slightly moist, friable, very slightly calcareous CLAY LOAM with a weakly developed, very fine granular structure, with occasional medium subangular blocky peds*. 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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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, 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).

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 *clay loam* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

Such soils usually have good water and nutrient retention capacities, but they are also prone to structural degradation and compaction during handling, and especially when plastic in consistency. Any damage to the structural condition of this soil is likely to reduce its drainage and aeration properties.

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 acid in reaction (pH 5.8), with a pH value that would be suitable for general landscape purposes and in particular acid-loving species (calcifuges). This pH value is unlikely to be suitable for species known to specifically require or prefer alkaline soil, and in this instance the soil would benefit from further amelioration to raise its pH (e.g. lime application).

The electrical conductivity (salinity) value (water extract) was low, which indicates that soluble salts were not 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 adequately 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 requirement 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 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 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 *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 an acidic, non-saline, very slightly calcareous, virtually stone-free clay loam with an adequate structure. The sample contained sufficient reserves of 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 (trees, shrubs and amenity grass), provided species with a wide pH tolerance or those that prefer acid soils are selected, and the physical condition of the soil is satisfactory.

Unless acid loving species have been selected, this soil could benefit from an application of lime to raise its pH.

The topsoil was also fully compliant with the requirements of the British Standard for Topsoil (*BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil*).

RECOMMENDATIONS

Lime Application (if needed)

Liming is routinely used to raise the pH of inherently acid soil to a more suitable level. A pH value of 6.5 is typically sought after for most plants. We recommend incorporating agricultural grade crushed limestone or chalk at the rate of **600 g/m²**, and incorporating evenly to a depth of 200mm.

Soil Handling Recommendations

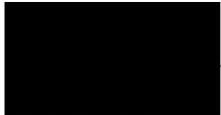
It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is sufficiently dry to be 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



Ross Friar
MEnvSci
Graduate Soil Scientist



Aaron Cross
BSc MSc
Senior Soil Scientist

For & on behalf of Tim O'Hare Associates LLP



Client:	Crownhill Topsoil
Project:	Caerwent
Job:	Topsoil Analysis - BS3882:2015
Date:	21/11/2023
Job Ref No:	TOHA/23/1162/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	

Caerwent Screened Topsoil
19
33
48
CL
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	

5.8
415
2409
1.2
4.4
0.40
6
46
169
97

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	

5
0.3
18
< 1.8
18
35
< 0.3
18
< 1.0
64
0.6
< 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	
Benz(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
0.07
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	

< 0.020
< 0.020
< 0.050
< 1.0
< 2.0
< 8.0
< 8.0
< 10
< 0.010
< 0.010
< 0.050
< 1.0
< 2.0
< 10
16
16

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	

< 0.005
< 0.005
< 0.005
< 0.005
< 0.005
< 0.005

CL = CLAY LOAM

Visual Examination

The sample was described as a dark yellowish brown (Munsell Colour 10YR 3/6), slightly moist, friable, very slightly calcareous CLAY LOAM with a weakly developed, very fine granular structure with occasional medium subangular blocky peds. The sample was virtually stone-free and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.



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

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