



TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr John Verrall
Penfold Verrall Ltd
Thistleworth Farm Cottage
Dial Post
Nr. Horsham
West Sussex
RH13 8NY

15th June 2011
Our Ref: TOHA/11/4149/LW
Your Ref: O/N 18040

Dear Sirs

RE: Topsoil Analysis Report: Brinsbury College

We have completed the analysis of the soil samples recently submitted referenced *As Dug* and *Screened*, and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the topsoil samples for general landscape purposes (trees, shrubs and amenity grass). In addition, these samples have been assessed to determine compliance with the requirements of the British Standard for Topsoil (*BS3882:2007 Specification for topsoil and requirements for use – Multipurpose Topsoil*).

This report presents the results of analysis for the samples submitted to our offices on 7th June 2011. This report relates to the samples submitted and should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by 3rd parties as a means of verification or validation testing, especially after the topsoil has left the site.

SAMPLE EXAMINATION

The *As Dug* sample was described as an olive brown, dry, friable, CLAY with a moderately developed, fine to medium granular, occasionally sub-rounded blocky, structure*. The sample was stone-free and contained occasional medium woody fibres and organic fines. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

The *Screened* sample was described as an olive brown, dry, friable, CLAY LOAM with a weakly developed, fine to medium granular structure*. The sample was slightly stony and contained frequent medium to coarse woody fibres, organic fines and fine roots. The sample contained a single thin strip of hard plastic. No unusual odours, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of disturbed samples. Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

Tim O'Hare Associates LLP
Howbery Park Wallingford Oxfordshire OX10 8BA

Registered in England No. 06524645 Registered Office: The Innovation Centre, Howbery Park, Wallingford, Oxfordshire OX10 8BA

ANALYTICAL SCHEDULE

The samples were submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soils, and the absence of potential contaminants. The following parameters were determined:

- particle size analysis and stone content;
- pH value;
- electrical conductivity values (CaSO₄ and water extracts);
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- soluble sulphate, elemental sulphur, acid volatile sulphide;
- total cyanide and total (mono) phenols;
- total petroleum hydrocarbons (C10-C40);
- speciated PAHs (US EPA16 suite).

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below. The interpretation considers the use of the topsoils for general landscape purposes.

RESULTS OF ANALYSIS

Particle Size Analysis and Stone Content

The samples fell into the *clay* and *clay loam* texture classes. The soils would be described as moderately heavy to heavy in texture. 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. They tend to be slow-draining and can suffer from seasonal waterlogging following periods of prolonged or heavy rainfall. Any damage to the structural condition of these soils is likely to reduce their drainage and aeration characteristics even further.

The soils could be suitable for use in a number of landscape applications, including tree and shrub planting, native transplants and amenity grass, provided the structural condition of the soils is maintained and provided only plant species tolerant of moisture retentive, heavy soils are selected. The soils would not be considered suitable for plants or planting environments that require or prefer light or free-draining soils.

The *As Dug* sample had clay and sand contents which were outside the respective specified ranges given in BS3882:2007.

The samples were stone-free to slightly stony and, as such, stones will not restrict the use of the soils for general landscape purposes.

pH and Electrical Conductivity Values

The samples were slightly acid in reaction (pH 6.0-6.4), with pH values that would be considered ideal for most applications, including the majority of tree and shrub species and grass cultivars used in commercial and domestic landscapes.

The electrical conductivity (salinity) values (water extracts) were low and the calcium sulphate extracts (BS3882 requirement) fell below the maximum specified value (2800 µS/cm). As such, soluble salts were not present at levels that would be considered harmful to plants.

Organic Matter and Fertility Status

The samples were adequately supplied with organic matter and most major plant nutrients with regard to the specification. The level of extractable potassium for the *As Dug* sample (116 mg/l) did not meet the specified minimum value of 121 mg/l given in BS3882:2007: Table 1 for Multipurpose Topsoil.

Potential Contaminants

With reference to BS3882:2007 Table 1: Notes 2, 3 and 4, there is a requirement to confirm levels of potential contaminants in relation to the topsoils proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific criteria, the concentrations of

the potential contaminants that affect human health have been assessed against the Soil Guideline Values (SGVs) for *residential* end-use (Contaminated Land Exposure Assessment (CLEA) (EA/DEFRA: 2009) and the CIEH/LQM Generic Assessment Criteria (2nd Edition, 2009), as well as professional judgement.

Of the potential contaminants determined, none was found at levels that would indicate significant contamination with respect to the proposed end use of these soils.

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 BS3882:2007 – Table 1

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil samples for general landscape purposes. The analysis has also been undertaken to determine the samples compliance with the requirements of the British Standard for Topsoil (BS3882:2007 *Specification for topsoil and requirements for use – Multipurpose Topsoil*).

From the soil examination and laboratory analysis, the samples were described as slightly acid, stone-less to virtually stone-free, clay loam and clay with adequate structures. The fertility status was low to moderate and no significant contamination was found with respect to the contaminants determined.

To conclude based on our findings, the topsoils represented by these samples have a number of limitations which should be considered before they are used for landscaping purposes. Whilst the soils currently have a defined structure, they will be prone to structural degradation.

The soils have potential for use in landscaping provided the following criteria can be met:

- the physical condition of the topsoil should be maintained, and compaction and structural degradation must be avoided (see *Soil Handling* section below).
- the nutrient deficiencies should be remedied by fertiliser applications;
- plants selected should be tolerant of heavy, moisture retentive soils;
- the proposed planting environment should not require a light or free-draining soil.

The *As Dug* sample was largely compliant with the requirements of the British Standard for Topsoil (BS3882:2007 *Specification for topsoil and requirements for use – Multipurpose Topsoil*) with exception of the clay and sand contents and extractable potassium.

The *Screened* sample was compliant with the requirements of the British Standard for Topsoil (BS3882:2007 *Specification for topsoil and requirements for use – Multipurpose Topsoil*).

RECOMMENDATIONS

Fertiliser for Planting

To address the nutrient deficiencies and to help promote effective establishment, we recommend applying and incorporating the compound, slow release fertiliser *N-Mag Lite* (3%N:17%P₂O₅:10%K₂O: 5%MgO) at a rate of 80g/m² and to a depth of 250mm.

Fertiliser for Amenity Grass Establishment

To address the nutrient deficiencies and to help promote effective grass establishment, we recommend applying and incorporating the pre-seeding grass fertiliser *Scotts PS5 Preseeder* (8%N:12%P₂O₅:8%K₂O +2%Mg+seaweed extract) prior to seeding or turfing at a rate of 35 g/m² and to a depth of 100mm.

Soil Handling Recommendations

The moderate to heavy texture of these soils will make them particularly vulnerable to physical degradation (compaction) during all phases of soiling and landscape works. It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking, and soil handling should be stopped during and after heavy rainfall, and not continued until the soil has returned to a friable state. If the soil is damaged its potential for re-use will be limited. Therefore, to maintain the physical condition of the soil and avoid structural damage, all phases of soil handling operations (e.g. respreading, cultivating, and planting) should only be carried out when the soil is reasonably dry and non-plastic (friable) in consistency.

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 sincerely

Leila Wakeham
BSc MSc
Soil Scientist

For & on behalf of Tim O'Hare Associates LLP

Tim O'Hare
BSc MSc MSc MBIAC CSci
Principal Consultant



TIM O'HARE ASSOCIATES

SOIL & LANDSCAPE CONSULTANCY

Client: **Penfold Verrall Ltd**
 Client Ref: **Topsoil Analysis - Brinsbury College**
 Date: **June 2011**
 Job Ref No: **TOHA/11/4149/LW**

Sample Reference		As Dug	Screened
Clay (<0.002mm)	%	39	33
Silt (0.002-0.063mm)	%	36	29
Sand (0.063-2.0mm)	%	25	38
Texture Class (UK Classification)	—	C	CL
Stones (2-20mm)	% DW	0	2
Stones (20-50mm)	% DW	0	0
Stones (>50mm)	% DW	0	0
pH Value (1:2.5 water extract)	units	6.0	6.4
Electrical Conductivity (1:2.5 water extract)	uS/cm	188	321
Electrical Conductivity (1:2 CaSO4 extract)	uS/cm	2148	2321
Exchangeable Sodium Percentage	%	1	2
Organic Matter (WB)	%	3.2	4.1
Total Nitrogen (Dumas)	%	0.17	0.21
C:N Ratio	:1	11	11
Extractable Phosphorus	mg/l	16	24
Extractable Potassium	mg/l	116	259
Extractable Magnesium	mg/l	93	150
Total Arsenic (As)	mg/kg	12	12
Total Cadmium (Cd)	mg/kg	0.2	0.1
Total Chromium (Cr)	mg/kg	26	28
Total Copper (Cu)	mg/kg	10	11
Total Lead (Pb)	mg/kg	19	25
Total Mercury (Hg)	mg/kg	0.02	<0.02
Total Nickel (Ni)	mg/kg	<10	11
Total Selenium (Se)	mg/kg	0.5	0.4
Total Zinc (Zn)	mg/kg	44	45
Water Soluble Boron (B)	mg/kg	1	1
Total Cyanide (CN)	mg/kg	<1	<1
Total (mono) Phenols	mg/kg	<1	<1
Elemental Sulphur (S)	mg/kg	<20	<20
Acid Volatile Sulphide (S)	mg/kg	<1	2
Water Soluble Sulphate (SO4)	g/l	0.02	0.03
TPH (C10-C40)	mg/kg	<50	<50
Naphthalene	mg/kg	<0.4	<0.4
Acenaphthylene	mg/kg	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1
Phenanthrene	mg/kg	<0.2	<0.2
Anthracene	mg/kg	<0.1	<0.1
Fluoranthene	mg/kg	0.2	<0.2
Pyrene	mg/kg	<0.2	<0.2
Benzo(a)anthracene	mg/kg	<0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b)fluoranthene	mg/kg	0.2	<0.1
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1
Benzo(a)pyrene	mg/kg	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1
Total PAHs (sum USEPA16)	mg/kg	<2	<2

C = CLAY
 CL = CLAY LOAM

Tim O'Hare Associates LLP Howbery Park Wallingford Oxfordshire OX10 8BA Tel: 01491 822653 www.toha.co.uk