

Mr Matt Matkins Ferns Aggregates Wrotham Quarry Trottiscliffe Road Addington Wrotham ME19 5DP

> 13<sup>th</sup> July 2023 Our Ref: TOHA/23/7992/SS

> > Your Ref: PO 275511

**Dear Sirs** 

## **Topsoil Analysis Report: Wrotham Quarry**

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

The purpose of the analysis was to determine the suitability of the 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 Ferns Aggregates site.

#### SAMPLE EXAMINATION

The sample was described as a very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable, very slightly calcareous LOAMY SAND with a weakly developed very fine to fine, and occasionally medium, granular structure\*. The sample was slightly stony, and contained a moderate proportion of organic fines and occasional woody fragments. 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.

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

The stone content of the sample was low and, as such, stones should not restrict the use of the soil for general landscape purposes.

#### pH and Electrical Conductivity Values

The sample was alkaline in reaction (pH 7.5). This pH value would be considered suitable for general landscape purposes provided species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

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.

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## 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 sample for general landscape purposes (trees, shrubs and 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).

From the soil examination and subsequent laboratory analysis, the sample was described as an alkaline, non-saline, very slightly calcareous loamy sand with a weakly developed structure and a low stone content. The sample was adequately supplied with 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 known to prefer alkaline soils are selected and the physical condition of the soil is satisfactory.

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

## 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 reasonably dry and 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

Aaron Cross BSc MSc Soil Scientist

For & on behalf of Tim O'Hare Associates LLP

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Client:	Ferns Aggregates
Project	Wrotham Quarry
Job:	Topsoil Analysis - BS3882:2015
Date:	13/07/2023
Job Ref No:	TOHA/23/7992/SS

Sample Reference	Wrotham Quarry Topsoil		
	1	Accreditation	
Clay (<0.002mm)	%	UKAS	5
Silt (0.002-0.063mm)	%	UKAS	9
Sand (0.063-2.0mm)	%	UKAS	86
Texture Class (UK Classification)	 0/ DIM	UKAS	LS
Stones (2-20mm)	% DW	GLP	2
Stones (20-50mm) Stones (>50mm)	% DW % DW	GLP GLP	0
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oH Value (1:2.5 water extract)	units	UKAS	7.5
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	636
Electrical Conductivity (1:2 CaSO <sub>4</sub> extract)	uS/cm	UKAS	2678
exchangeable Sodium Percentage	%	UKAS	3.7
Organic Matter (LOI)	%	UKAS	6.6
Total Nitrogen (Dumas)	%	UKAS	0.20
C : N Ratio Extractable Phosphorus	ratio	UKAS UKAS	19 63
	mg/l		
Extractable Potassium	mg/l	UKAS UKAS	712 111
xtractable Magnesium	mg/l	UNAS	
otal Arsenic (As)	mg/kg	MCERTS	11
Fotal Cadmium (Cd)	mg/kg	MCERTS	< 0.2
otal Chromium (Cr)	mg/kg	MCERTS	31
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 1.8
Total Copper (Cu)	mg/kg	MCERTS	10
Total Lead (Pb)	mg/kg	MCERTS	15
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	16
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Fotal Zinc (Zn)	mg/kg	MCERTS	35
Water Soluble Boron (B)	mg/kg	MCERTS	1.1
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
		MOEDTO	0.05
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene Acenaphthene	mg/kg mg/kg	MCERTS MCERTS	< 0.05 < 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
ndeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(q,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) Aromatic TPH >C5 - C7	mg/kg	MCERTS MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg		< 0.001
Aromatic TPH >C7 - C8 Aromatic TPH >C8 - C10	mg/kg mg/ka	MCERTS MCERTS	< 0.001 < 0.001
Aromatic TPH >C8 - C10 Aromatic TPH >C10 - C12	5	MCERTS MCERTS	< 0.001 < 1.0
Aromatic TPH >C10 - C12  Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 1.0 2.5
Aromatic TPH >C12 - C16 Aromatic TPH >C16 - C21	mg/kg		
	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35 Aromatic TPH (C5 - C35)	mg/kg mg/ka	MCERTS MCERTS	< 10 14
110111410+11 11 (00 - 000)	mg/kg	WIOLITIO	14
Benzene	mg/kg	MCERTS	< 0.005
Toluene	mg/kg	MCERTS	< 0.005
Ethylbenzene	mg/kg	MCERTS	< 0.005
			< 0.005
o & m-xylene	mg/kg	MCERTS	< 0.000
o & m-xylene o-xylene MTBE (Methyl Tertiary Butyl Ether)	mg/kg mg/kg	MCERTS	< 0.005 < 0.005

LS = LOAMY SAND

Visual Examination
The sample was described as a very dark greyish brown (Munsell Colour 10YR 3/2), slightly moist, friable, very slightly calcareous LOAMY SAND with a weakly developed very fine to fine, and occasionally medium, granular structure. The sample was slightly stony, and contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

Aaron Cross BSc MSc Soil Scientist

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

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