

RootSpace Soil Specification

To be read with Preliminaries / General Conditions.

SPECIFICATION OUTLINE

100 ROOTSPACE SOILS

- This soil specification document sets out the requirements for soils (topsoil and subsoil) to be used with the GreenBlue Urban RootSpace System.
- *RootSpace Topsoil* is intended to be used to a thickness of 600mm (1 cell deep). Where additional cells are required to achieve the target soil volumes, *RootSpace Subsoil* is recommended for use within the deeper cells. *RootSpace Subsoil* is also recommended for use beneath the tree rootball.
- Important soil properties relating to soil function and the long-term support of trees are also considered within the specified parameters.
- The environmental properties of the soil used within the cell system are relevant for human health, plant health and protection of the wider environment.
- The most appropriate types of topsoil will be from a *soil manufacture operation* which utilises clean, uncontaminated 'components' that are processed and blended to achieve the required soil composition on a consistent basis.
- An appropriate subsoil would be a clean quarried material or suitable, clean overburden material from a quarry operation.

SOILS

300 SOIL MATERIALS GENERALLY

- Purity: Free of pests, disease, and fungus.
- Foreign matter: On visual inspection, free from non-soil material, brick and other building materials and wastes, sharps, hydrocarbons, plant matter, weed roots, stolons, rhizomes, and any other foreign matter or material or substance that would render the soil or soil ameliorant unsuitable for horticultural use.
- Contamination: Do not use soils contaminated with rubbish or other materials that are:
 - Corrosive, explosive or flammable.
 - Hazardous to human or animal life.
 - Detrimental to healthy plant growth.
- Give notice: If any evidence or symptoms of soil contamination are discovered in soil (topsoil or subsoil) to be used.

310 ROOTSPACE TOPSOIL

- Quantity: Provide as necessary to complete the work.
- The topsoil shall comply with the following lower and upper limits:

Parameter	Unit	Lower Limit	Upper Limit
Clay (<0.002mm)	%	5	18
Silt (0.002-0.05mm)	%	5	30
Sand (0.05-2.0mm) Of which at least 45% shall fall into fine to medium sand range	%	65	85
Stones (2-20mm)	%DW	--	15
Stones (>20mm)	%DW	--	0
pH Value	Unit	5.5	8.5
Electrical Conductivity (1:2.5 water extract)	µS/cm	--	1500
Electrical Conductivity (CaSO4 extract)	µS/cm	--	3300
Exchangeable Sodium Percentage	%	--	15
Organic Matter	%	4.0	10.0
Total Nitrogen	%	0.20	--
Carbon: Nitrogen Ratio	--	--	20:1
Extractable Phosphorus	mg/l	26	100
Extractable Potassium	mg/l	240	1500
Extractable Magnesium	mg/l	50	600

320 ROOTSPACE SUBSOIL

- Quantity: Provide as necessary to complete the work.
- The subsoil shall comply with the following lower and upper limits:

Parameter	Unit	Lower Limit	Upper Limit
Clay (<0.002mm)	%	0	20
Silt (0.002-0.05mm)	%	0	25
Sand (0.05-2.0mm) Of which at least 45% shall fall into fine to medium sand range	%	70	95
Stones (2-20mm)	%DW	--	30
Stones (>20mm)	%DW	--	0
pH Value	Unit	5.0	8.5
Electrical Conductivity (1:2.5 water extract)	µS/cm	--	1500
Electrical Conductivity (CaSO4 extract)	µS/cm	--	3300
Exchangeable Sodium Percentage	%	--	15
Organic Matter	%	--	1.5

330 ENVIRONMENTAL REQUIREMENTS

- The following Generic Assessment Criteria (GAC) shall be used as Tier 1 screening values for the assessment of soil(s) to be used within the RootSpace System, unless Site-Specific Assessment Criteria (SSAC) are available for the site where the soil(s) is to be used.
- In circumstances where any of these values are exceeded, further risk assessment and/or testing should be undertaken to confirm the significance of the non-compliance.

Parameter	Unit	Generic Assessment Criteria
Inorganic Arsenic	mg/kg	37
Boron (soluble)	mg/kg	290
Cadmium	mg/kg	11
Chromium (III)	mg/kg	910
Chromium (IV)	mg/kg	4.3
Copper	mg/kg	100
Lead	mg/kg	200
Mercury	mg/kg	1.2
Nickel	mg/kg	180
Selenium	mg/kg	250
Zinc	mg/kg	200
Phenol	mg/kg	280
Benzene	mg/kg	0.87
Toluene	mg/kg	130
Ethylbenzene	mg/kg	47
Xylene - m	mg/kg	59
Xylene - o	mg/kg	60
Xylene - p	mg/kg	56
Aliphatics C5-C6	mg/kg	42
Aliphatics C6-C8	mg/kg	100
Aliphatics C8-C10	mg/kg	27
Aliphatics C10-C12	mg/kg	130
Aliphatics C12-C16	mg/kg	1100
Aliphatics C16-C35	mg/kg	65000
Aromatics C5-C7	mg/kg	70
Aromatics C7-C8	mg/kg	130
Aromatics C8-C10	mg/kg	34

Parameter	Unit	Generic Assessment Criteria
Aromatics C10-C12	mg/kg	74
Aromatics C12-C16	mg/kg	140
Aromatics C16-C21	mg/kg	260
Aromatics C21-C35	mg/kg	1100
Acenaphthene	mg/kg	210
Acenaphthylene	mg/kg	170
Anthracene	mg/kg	2400
Benzo(a)anthracene	mg/kg	7.2
Benzo[a]pyrene	mg/kg	2.2
Benzo(b)fluoranthene	mg/kg	2.6
Benzo(g,h,i)perylene	mg/kg	320
Benzo(k)fluoranthene	mg/kg	77
Chrysene	mg/kg	15
Dibenzo[a,h]anthracene	mg/kg	0.24
Fluoranthene	mg/kg	280
Fluorene	mg/kg	170
Indeno(1,2,3-cd)pyrene	mg/kg	27
Naphthalene	mg/kg	2.3
Phenanthrene	mg/kg	95
Pyrene	mg/kg	620
Asbestos screen	Present/ Absent	Absent

GAC values derived from LQM/CIEH S4ULs 2015, DEFRA SP1010 (2014) and BS3882:2015

TESTING

600 PROGRAMME FOR SOURCING SOIL

- Sufficient time should be allowed for sourcing and testing the proposed soil(s) to meet the requirements of this soil specification.
- At least 4 weeks is recommended for sourcing soils so that the necessary testing can be undertaken to demonstrate compliance with the specification.

605 SAMPLING PROTOCOL

- The soil(s) to be considered for use within the RootSpace system shall be sampled before placement and preferably while stockpiled off site at its source or manufacture location.
- The sample(s) shall be truly representative of the soil to be offered. One *Composite Sample* shall be taken for every **250m³** of each type of soil to be used.
- Each composite sample should be made up of **10 No. sub-samples** taken from evenly spaced locations across the stockpile/field. The sub-samples shall be mixed together and quartered down to form a **5kg** composite sample.
- Each composite sample shall be placed in a clean, strong plastic bag and a 250ml brown glass, wide-necked jar (for organics testing) and each labelled with the source reference and date of sampling.
- Soils of different types should never be mixed to form a composite sample.

615 SOIL TESTING

- Soil samples shall be sent to an independent soil science testing facility with a request for each sample to be analysed strictly in accordance with relevant Testing Schedule given in clauses 620 or 625, and reported in accordance with the requirements of clause 630.

- An approved soil science testing facility is:

Tim O'Hare Associates LLP
Howbery Park
Wallingford
Oxfordshire OX10 8BA
UK
Tel: +44 (0)1491 822653
www.toha.co.uk

620 TOPSOIL TESTING

- The following parameters shall be requested (methods in accordance with BS3882:2015 or as indicated):
 1. Visual examination to record Munsell colour, moisture status, plasticity, aerobic state, presence of any deleterious materials or unusual odours (e.g. petroleum hydrocarbons).
 2. pH Value (1:2.5 soil/water extract)
 3. Electrical Conductivity (1:2.5 soil/water extract)
 4. Electrical Conductivity (1:2.5 soil/CaSO₄ extract)
 5. Exchangeable Sodium Percentage
 6. Particle Size Analysis (clay, silt, 5 sands – ASTM sieve sizes)
 7. Stone Content by % weight (2-20mm, 20-50mm, >50mm)
 8. Total Nitrogen
 9. Extractable Phosphorus, Potassium & Magnesium
 10. Organic Matter
 11. Carbon: Nitrogen ratio (by calculation)
 12. **Potential Contaminants** – See parameters in **Clause 330**

625 SUBSOIL TESTING

- The following parameters shall be requested (methods in accordance with BS8601:2013 or as indicated):
 1. Visual examination to record Munsell colour, moisture status, plasticity, aerobic state, the presence of any deleterious materials or unusual odours (e.g. petroleum hydrocarbons).
 2. pH Value (1:2.5 soil/water extract)
 3. Electrical Conductivity (1:2.5 soil/water extract)
 4. Electrical Conductivity (1:2.5 soil/CaSO₄ extract)
 5. Exchangeable Sodium Percentage
 6. Particle Size Analysis (clay, silt, 5 sands – ASTM sieve sizes)
 7. Stone Content by % weight (2-20mm, 20-50mm, >50mm)
 8. Organic Matter
 9. **Potential Contaminants** – See parameters in **Clause 330**

630 REPORTING

- The results of analysis for each source of soil shall be presented on a *Certificate of Analysis*.
- The *Certificate* shall be accompanied by an *Interpretive Report*. The report shall confirm the sample's compliance or non-compliance with the relevant soil specification, and advise on the significance of any non-compliances with regards to the re-use of the soil in the RootSpace system.
- The report shall also provide recommendations for improving the composition of the soil, including fertiliser, lime or compost applications, should this be necessary.
- Number of copies: 1 electronic copy (PDF format)

SOIL MANAGEMENT

700 SAMPLE LOADS

- Deliver to site a sample load of each soil type.
- Give notice: Allow inspection before making further deliveries to site. Retain for comparison with subsequent loads.
- Notice period: 72 hours.

720 SOIL HANDLING

- Soil handling and placement operations shall be carried out when the soil is non-plastic (friable) in consistency and capable of in-filling the cell.
- Soil handling shall be stopped during and after heavy rainfall, and should not continue until the soil has regained a non-plastic (friable) consistency.
- Contamination: Do not mix topsoil or subsoil together or with:
 - stone, hardcore, rubbish or material from demolition work.
- Multiple handling: Keep to a minimum.
- Soil shall not be unnecessarily compacted by trampling or trafficking by site machinery.
- Select and use plant to minimise disturbance, trafficking and compaction.

730 FERTILISER APPLICATION (PROVISIONAL ITEM)

- The use of additional fertilisers or any other soil ameliorants in the soil is dependent on the findings of the soil tests (as presented for clause 630 *Reporting*).
- A *provisional* allowance shall be made for the application of the compound, slow release fertiliser *Everris Enmag CRF* (11%N:22%P₂O₅:9%K₂O:6%MgO) at a rate of 80 g/m² to the upper RootSpace layer.

SPECIFICATION QUALIFICATIONS

This document considers the proposal to use the specified soils within the GreenBlue Urban RootSpace system. This document should not therefore be relied on for alternative end-uses for which it was not intended.

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