GENERAL:

1. The soil filter media is to be in accordance with the specifications below based on the guideline specifications for soil media in bioretention systems (Adoption Guidelines for Stormwater Biofiltration Systems, CRCWSC, 2015)
2. The contractor or soil manufacturer must submit samples of soil to a NATA accredited laboratory to verify compliance with the specification. The contractor is to supply a certificate clearly stating compliance.
3. For a proprietary product line a document produced by the supplier may be acceptable as a compliance certificate under the following circumstances:
   3.1. it is an 'off the shelf. product line and not a custom mix
   3.2. if a representative test certificate is available and produced within the last 6 months
   3.3. if the testing covers the criteria in the specification
   3.4. the manufacturers quality assurance system is externally certified.
4. Generally the soil must be free of unwanted deleterious material
5. Potential filter media should generally be assessed by a horticulturalist to ensure that they are capable of supporting a healthy vegetation community. This assessment should take into consideration delivery of nutrients to the system by stormwater. Any component or soil found to contain high levels of salt (as determined by ec measurements), high levels of clay or silt particles (exceeding the particle size limits), or any other extremes which may be considered retardant to plant growth should be rejected.

RAINGARDEN SOIL MEDIA:

1. Filter Layer
   1.1. The material can be of siliceous or calcareous origin and should be a sandy loam to loamy sand. The soils should contain some organic matter (2-5% w/w) but be low in nutrients.
   1.2. Filter materials shall have a saturated hydraulic conductivity in the range of 180 - 400 mm/h unless otherwise approved.
   1.3. The filter media should be well-graded and should have all particle size ranges present from the 0.075 mm to the 4.75 mm sieve (as defined by AS1289.3.6.1 - 2009). There should be no gap in the particle size grading, and the composition should not be dominated by a small particle size range.
   1.4. Filter materials, which comply with the particle size grading outlined below, will generally meet saturated hydraulic conductivity specifications.

Soil Physical Properties		
Description	Proportion	Grading
Clay and silt	<3%	<0.05 mm
Very fine sand	5-30%	0.05-0.15 mm
Fine sand	10-30%	0.15-0.25 mm
Medium to coarse sand	40-60%	0.25-1.0 mm
Coarse sand	7-10%	1.0-2.0 mm
Fine gravel	<3%	2.0-3.4 mm

2. Organic matter for ameliorating top 100mm
   2.1. The top 100 mm of the filter medium should be ameliorated with appropriate organic matter, fertiliser and trace elements with the constituents and quantities detailed in the table below.

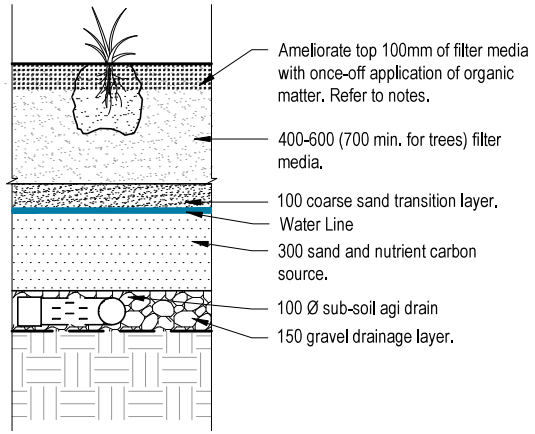
Organic amelioration	
Constituent	Quantity
Granulated poultry manure fines	5 kg/m³ or 500 g/m²
Superphosphate	0.2 g/m³ or 20 g/m²
Magnesium sulphate	0.3 g/m³ or 30 g/m²
Potassium sulphate	0.2 g/m³ or 20 g/m²
Trace Element Mix	0.1 g/m³ or 10 g/m²
Fertilizer NPK (16.4.14)	0.4 kg/m³ or 20 g/m²
Lime	2 kg/m³ or 200 g/m²

3. Transition layer
   3.1. Transition layer material shall be a clean, well-graded sand material containing <2% fines
   3.2. To avoid migration of the filter media into the transition layer, the particle size distribution of the sand should be assessed to ensure it meets 'bridging criteria', that is, the smallest 15% of the sand particles bridge with the largest 15% of the filter media particles (Water by Design, 2009; Vicroads, 2004):
      3.2.1. - D15 (Transition layer) ≤ 5 X D85 (Filter media) where: D15 (Transition layer) is the 15th percentile particle size in the transition layer material (i.e., 15% of the sand is smaller than D15 mm), and
      3.2.2. D85 (Filter media) is the 85th percentile particle size in the filter media
4. Submerged Zone
   4.1. Material as indicated on the drawings as submerged zone shall consist of transition layer material and mixed as follows (per 100 L):
      4.1.1. 98 litres of transition layer material;
      4.1.2. 500 g biodegradable sugar cane mulch; and
      4.1.3. 1.5 kg recycled, untreated hardwood chips or plantation hardwood chips.
5. Drainage Layer
   5.1. Drainage layer material is to be clean, fine gravel, such as a 2 - 5 mm washed screenings as shown in the table below.
   5.2. Scoria or quartz are not considered suitable materials for this application

Drainage layer particle distribution	
Particle size (mm)	% retained
Gtreater than 5.0	0
Superphosphate	102.0-5.00
Less than 2.0	0

6. Testing
   6.1. Particle size distribution (PSD)
   Variation in large particle sizes is flexible and an approved material does not have to be screened. however, the particle size distribution of the smaller particles (clay and silt) is a crucial element of the filter media specification and as such testing in accordance with as1289.3.6.1 - 2009 would be required.
   6.2. Filter Media
   Filter media must be tested for the following:
   - Total nitrogen (TN) content - 600 - 800 mg/kg;
   - Orthophosphate (PO43-) content - <55 mg/kg. Soils with total phosphorus concentrations >100 mg/kg should be tested for potential leaching. Where plants with moderate phosphorus sensitivity are to be used, total phosphorus concentrations should be <20 mg/kg;
   - Organic matter content - between 3 and 5% (w/w). In order to comply with both this and the TN and PO43- content requirements, a low nutrient organic matter will be required;
   - pH - as specified for 'natural soils and soil blends' 5.5 - 7.5 (pH 1:5 in water);
   - Electrical conductivity (EC) - as specified for 'natural soils and soil blends' <1.2 dS/m;
   - Phosphorus - <100 mg/kg. soils with phosphorus concentrations >100 mg/kg should be tested for potential leaching. Where plants with moderate phosphorus sensitivity are to be used, phosphorus concentrations should be <20 mg/kg; and
   - Saturated hydraulic conductivity - of potential filter media should be measured using the ASTM F1815-06 method. this test method uses a compaction method that best represents field conditions and so provides a more realistic assessment of hydraulic conductivity than other test methods.

   Media that do not meet these specifications should be rejected or amended.
   6.2. Optional testing:
      6.2.1. Dispersibility - This should be carried out where it is suspected that the soil may be susceptible to structural collapse. If in doubt, then this testing should be undertaken.



TYPICAL RAINGARDEN PROFILE

No	Revision	Date
A	APPROVED FOR USE	FEB 2023

CITY OF PORT PHILLIP

DRAWING NOT TO SCALE

Approved: Project Services

Date: FEB. 2023

Drawing Title: BIORETENTION SYSTEM MEDIA SPECIFICATION

Original Size: A3

Drawing No: CPP3510

Rev: A

Plot Date: 17 February 2023 - 12:08 PM