Planting and Installation details
Soil Specification under paved areas.

Trees in Limited Space

The specification prepared for Newcastle a Council based on the Amsterdam tree soil pits comprise compacted soil in two or three layers. At the surface, a paving bedding layer of medium – coarse sand is compacted to 100% Proctor Density. The Amsterdam soil below is usually one layer (A mix) and is compacted to 1.5 – 2.0 MPascal, which equates to about 70 – 80% Proctor Density (Couenberg, 1993) by way of watering in layers. Note that Councils standard drawings and soil specification have been finalised in consultation with NCC engineers.

In this situation, trees will be containerised by the surrounding environment such as roads or buildings, and have limited surrounding space. Pits will generally be in a 3.4m wide footpath, and have a 1.2m grate installed at the surface. The root ball is excavated to 600mm depth. The U-pipe or drainage sheets will facilitate oxygen transport within the profile (see figures 4 and 5). Where the site has good drainage, then the 2 soil layers (bedding sand over A Mix figure 4) should be used. Where the site has poor drainage, then the 3 soil layers (bedding sand over A and B horizon figure 5) should be used.

Ideally, trees along the footpath will be spaced close enough together to warrant a continuous trench. Continuous trenching will provide additional space for roots to inhabit, and decrease the risk of roots seeking the surface close to the root ball. If pits are isolated, only smaller trees should be planted, and the risk of heave is increased. (see Councils Street tree Selection Manual 2016)

When using grates, the centre hole must be enlarged as the tree grows, otherwise it will girdle the tree, and at the same time the grates will lift (Urban, 2008). With limited space, it must be expected that trees will not grow to their maximum capacity. These footpath trench situations are most suited to small to medium trees.

Use trees with minimal surface rooting such as plane trees to minimise heave. Fig trees, for example, will cause heave.

Installation Detail

There are two details in the figure below taken from the original SESL report prepared for Council.

- Figure 1 Typical cross section:

  Is to be used in footways with good subsoil drainage (e.g. sand). This option installs 2 layers. One layer is the A mix soil and the other is the bedding sand for the pavers.

- Figure 2 Typical cross section:

  Is to be used in footways with poorer subsoil drainage (e.g. silty loam or clay). This option installs 3 layers. Two distinct soil layers A and B mix and one layer of bedding sand for the pavers.

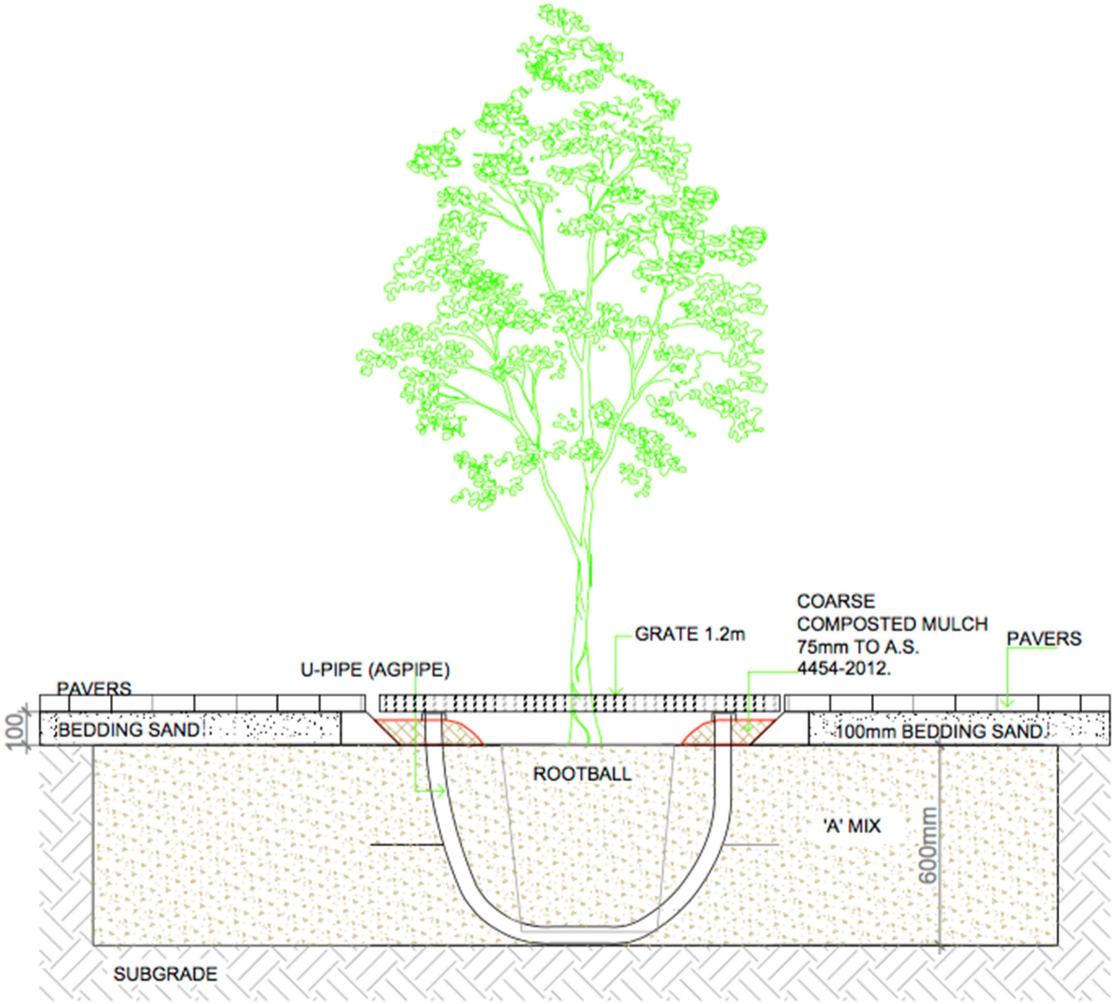

Figure 3 Typical cross section: Restricted space good drainage option (2 layers). Refer to Council's standard drawings for design detail.

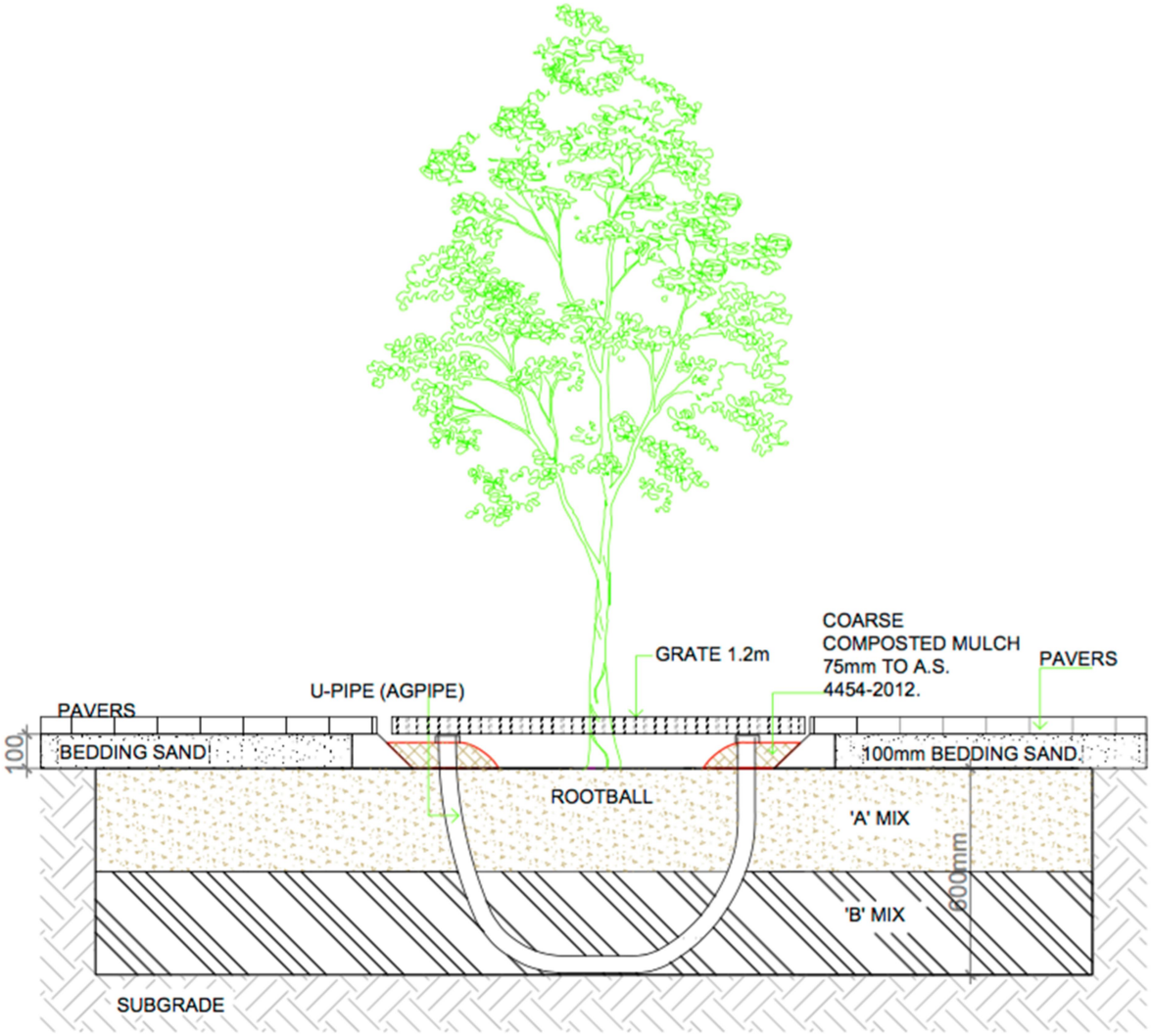

Figure 4 Typical cross section: Restricted space poor drainage option (3 layers). Refer to Council's standard drawings for design details.

Compaction

The blends provided by the suppliers that met the specified requirements were analysed to determine maximum dry density (100%) compaction, and the saturated uncompacted density. Comparing the two results allows an understanding of how compacted the material becomes when watered but not subjected to additional compaction.

The two blends that met the specification almost reach between 93% and 100% density, just by saturating with water.

As the USGA hydraulic conductivity method is a saturated hydraulic conductivity, this indicates that even at maximum compaction, these blends will still have a permeability of >30mm/hr which is ideal for street tree pits.

Installation Instructions

1. Locate services
2. Excavate pit to 600mm depth. Link pits with trenches if required. Excavate by hand around services if required.
3. If required as per drawing, install a U-pipe into the base of the pit, with both ends open to the surface
4. Do not artificially compact the A or B horizon soil
5. Backfill the pit with 300mm of A or B horizon mix as required. Wet the material during progressive placement of this 300mm layer being careful not to completely saturate the soil. The soil will slump naturally.
6. Install the additional 300mm of the A horizon mix over the surface until level with the top of the root ball. Wet the material during progressive placement of this layer being careful not to completely saturate the soil (i.e. no separation of by particle size should occur).
7. Do not cover the root ball with any soil.
8. If additional fertilizer is required, add slow release fertilizer across the surface of the soil.
9. Above the rootball, but taking care to keep mulch directly off the tree trunk, add maximum 75mm of coarse mulch that meets Councils requirements for course mulch and AS 4454 requirements
10. Install grate attaching to concrete edge.
11. Install bedding sand over the areas to be paved and lightly compact to achieve 100% Proctor Density. Note: the method used should not compress the soil below. Typically this will be two passes with a vibrating plate as the mechanical compaction (not roller).