

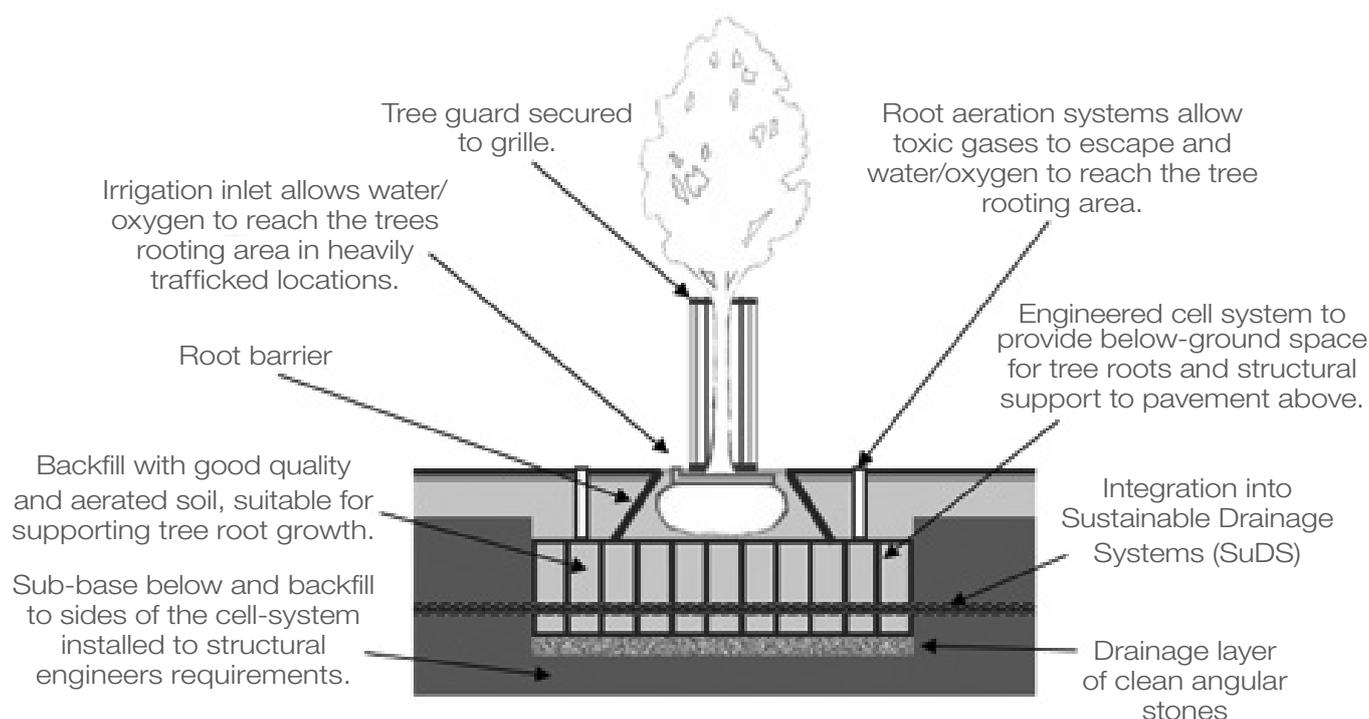
# Tree pit design in a hard surface environment - Guidance Note

**To maximise the positive contribution trees make to the built environment, whilst maintaining a balance with the other priorities, they must be considered at the design stage.**

**Trees often have to be incorporated into hard landscapes. But their settings need to be properly designed if they are not to suffer stunted growth or die.**

**There are no universal tree pit designs and each development will have its own challenges. This guidance sets out the expectations of Wycombe District Council within the context of industry best practice.**

Where trees are planted in green spaces, little more may be required than digging a suitably sized pit before placing the tree and then backfilling using the excavated soil. However, in hard surfaced areas, the ability of roots to grow naturally is likely to be severely restricted. In such situations developers are expected to provide a tree pit design which is suitable for that environment. For example, designs may need to include some of the following features:



## The Rooting Environment

Providing a suitable rooting environment is key to successful tree establishment.

Ensuring a newly-planted tree has sufficient good quality, uncompacted soil increases its chances of becoming successfully established without disrupting the surrounding infrastructure.

There are various methods for estimating soil volume. The council works to a calculation of 0.6m<sup>3</sup> of available, good quality and aerated soil per 1m<sup>2</sup> of crown projection at maturity\*. This calculation is a guideline and does not take into account the water-use strategies of different tree species, or the characteristics of specific growing media. It does provide a minimum requirement upon which to base a tree pit design. Certain design features may reduce the soil volumes required within the pit itself, such as interconnected pits, or incorporation of root paths to nearby uncompacted soil.

\*based on the work of Lindsey & Bassuk (1991) Tree pit design in a hard surface environment – Guidance note November 2018

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Below are examples of the minimum soil volume requirements for species often planted in urban environments.

Common name	Height*	Spread*	Minimum soil volume requirements
Whitebeam	10m	6m	17m <sup>3</sup>
Field maple	12m	7m	23m <sup>3</sup>
Small-leaved lime	24m	9m	38m <sup>3</sup>

## Load-bearing surfaces

Achieving sufficient soil volume on sites where the planting area is subjected to a load - such as car parking spaces above tree roots - requires below ground support. Two of the most commonly used methods are structural soils and below-ground, pre-engineered cells.

- Structural soils are appropriate where other, non-structural soil is also readily available to the tree. For example, trees planted within a parking area adjacent to a soft landscape area, where tree roots can grow beneath the hard surfacing, but have access to adjacent uncompacted soil.
- Pre-engineered cells filled with soil may be necessary in more urban areas where tree roots have fewer opportunities to access soil beyond the tree pit.

The use of either approach requires specialist knowledge and advice should be sought from the manufacturer/supplier before being included in the tree pit design.

## Root barriers and deflectors

Root barriers or deflectors may be incorporated into a tree pit design to physically manage the direction of root growth. They are useful where roots may potentially cause damage to the surrounding infrastructure. Unless there is a specific need to restrict root growth, root barriers should not be used to line the tree pit. Designs which unnecessarily restrict drainage or create a barrier to root growth beyond the planting pit prevent trees exploiting adjacent uncompacted soil. This can adversely affect the tree's long term survival.

## Surface Considerations

Sealing the surface with impervious material above the rooting area will limit gas exchange between the soil and atmosphere, creating an inhospitable environment for root development. Rain water will also run off the surface rather than seeping down into the roots, resulting in drought conditions. It is essential that surfaces allow gaseous exchange and for water to permeate through to the soil, or that they incorporate frequent irrigation/aeration inlets throughout the rooting area.

## Trees and Sustainable Drainage Systems (SuDS)

Trees and tree pits can be successfully incorporated into SuDS and have the potential to make a significant contribution to surface water management. The incorporation of trees into SuDS requires specialist knowledge and advice should be sought from industry professionals at the design stage.

## Further Information

Trees and Design Action Group [www.tdag.org.uk/guides--resources.html](http://www.tdag.org.uk/guides--resources.html)

CIRIA. The SUD Manual (C753)

[www.ciria.org/Resources/Free\\_publications/SuDS\\_manual\\_C753.aspx](http://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx)

BS 8545:2014 Trees: [shop.bsigroup.com/ProductDetail/?pid=000000000030219672](http://shop.bsigroup.com/ProductDetail/?pid=000000000030219672)

WDC Residential Design Guidance

[www.wycombe.gov.uk/uploads/public/documents/Planning/Planning-policy/Residential-design-guidance/Draft-Residential-design-guidance-SPD.pdf](http://www.wycombe.gov.uk/uploads/public/documents/Planning/Planning-policy/Residential-design-guidance/Draft-Residential-design-guidance-SPD.pdf)