

Urban Tree Planting Design Guide

Edition 9



GreenBlue
URBAN



Establishing the future urban landscape

Urban Tree Planting Design Guide

Edition 9



Selfridges, Duke Street, London, UK

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St Peter's Square, Manchester, UK

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"No other single element can bring such a diverse and long lasting range of benefits to urban space, than established canopy volume trees."



Trees. They are the largest living things on earth - and live the longest.

What other single element, when carefully planted into a paved area, will bring the following benefits?

- | | |
|---------------------------------|---|
| 1. Increase property value | 12. Sequester carbon |
| 2. Increase in retail sales | 13. Reduction in crime rates |
| 3. Sound attenuation | 14. Bring nature into the built environment |
| 4. Biodiversity | 15. Improve habitats for birds and other wildlife |
| 5. Shade | 16. Assist in education |
| 6. Cooling | 17. Improve mental health |
| 7. Improving traffic behaviours | 18. Accelerate healing |
| 8. Improve physical health | 19. Reduce wind speed |
| 9. Provide 'sense of place' | 20. Life |
| 10. Give seasonal interest | 21. Remove airborne pollutants |
| 11. Reduce stormwater run off | 22. Provide oxygen |

This is why it is so important that when we plant a tree in the built environment, we provide the very best environment below ground. A tree in a paved surround is in an essentially hostile and highly compacted rooting area - as far removed from a forest floor situation as it is possible to get.

Heavy ground compaction - the friend of the civil engineer - is also public enemy number 1 for the root system of an urban tree. At **GreenBlue Urban**, our heritage is urban trees - this is our specialist area and our business is devoted to the development of products and methodologies which will bring canopy volume trees to our urban landscapes - for the generations to come.

The key to success is below ground - an investment which is out of sight immediately, but potentially manifests above ground for many decades, even centuries. Enjoy this planting guide!



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GBU HQ, Northpoint, Compass Park



Inside GBU HQ: The main entrance features a Ficus tree.

Company Profile

Founded in 1992, **Greenleaf** was set up to research and provide solutions for assisting trees in their battle to establish in urban spaces. With the goal of drastically improving urban planting success and increasing leaf canopy in urban areas, **Greenleaf** tirelessly analysed the challenges, the causes of failure and premature mortality endured by trees.

We then examined the negative impact poor planting can have on urban infrastructures. Having established the key issues for both of these, we then systematically researched the reasons for those issues and designed practical products, solutions and systems for trees.

In 2013, **Greenleaf** became **GreenBlue Urban Ltd**. The new name reflecting the increased importance of integrating green infrastructure with water sensitive urban design (WSUD).

The last two decades have seen relentless product development and advances in tree system technologies. The result is seen in **GreenBlue Urban's** enviable track record of successful schemes and the development of 'state of the art' sustainable tree pit designs. Local authorities, landscape architects, engineers and other related professionals increasingly turn to **GreenBlue Urban** for guidance and best practice advice in tree planting implementation.

In 2015, **GreenBlue Urban** moved to their new purpose-built premises in East Sussex. This new facility offers training workshops and demonstration planting areas for the latest generation of tree pit and WSUD planting systems.

As the market leader in specialist tree pit products, we are pleased to be in a position to present you with the definitive urban tree design manual – a result of 26 years of frontline experience in the field, exhaustive research, product development and field trials.

Coupled with this, we offer you to sample our support service – unrivalled in the tree planting world – let us help you achieve your vision.

Based in the UK, Canada, and the United States, **GreenBlue Urban** has offices and distribution around the world and has grown every year since its inception. Our programme of continuous product development ensures that specifiers and clients can rest assured that the systems we offer for urban planting schemes represent the best in the sector.

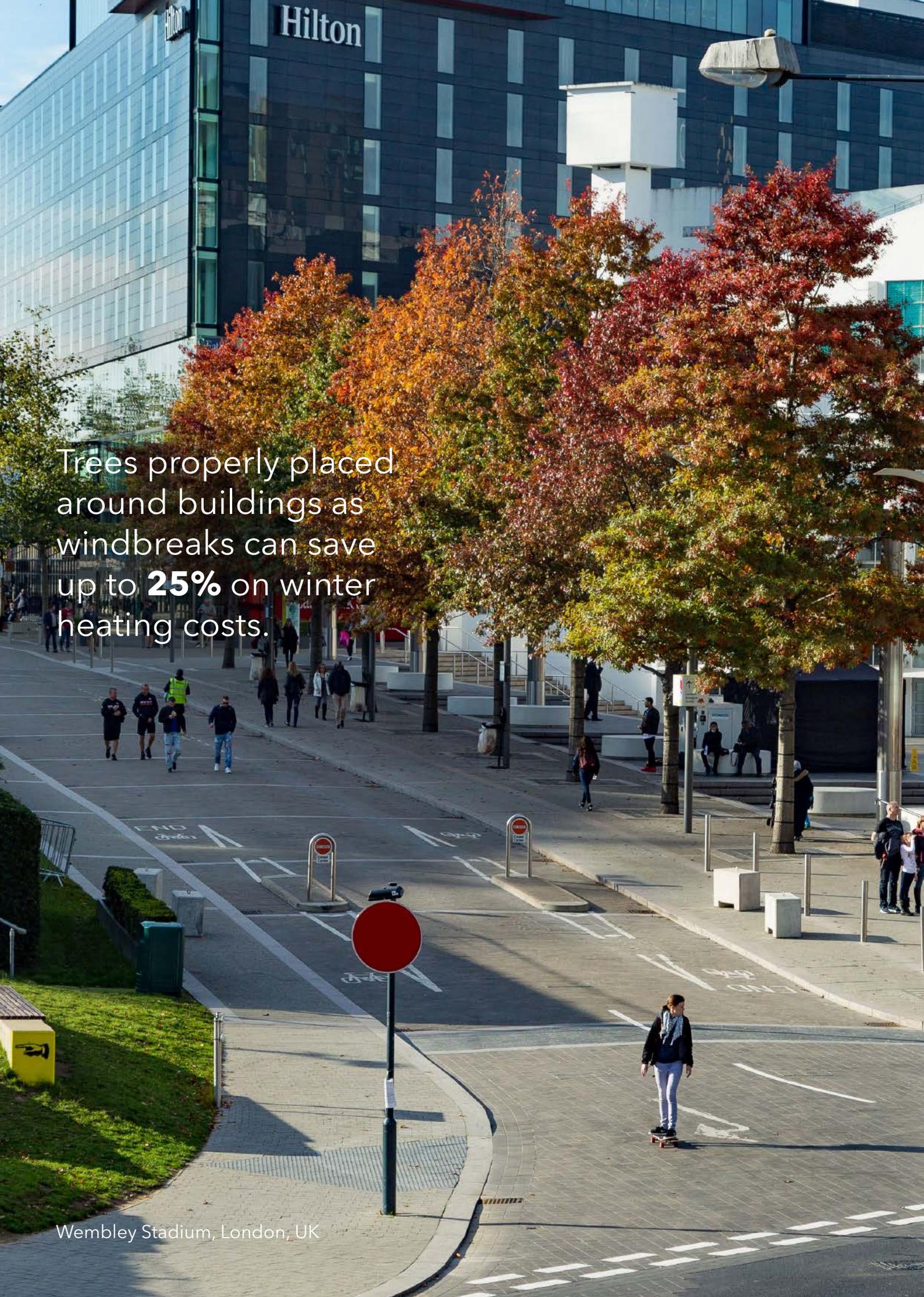


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Trees properly placed around buildings as windbreaks can save up to **25%** on winter heating costs.

Sustainability

Our commitment to sustainability is evidenced by the consistent use of recycled materials wherever possible in our products. **GreenBlue Urban's** contribution to tree planting projects worldwide is virtually incalculable and gives us an enviable carbon positive position. Furthermore, local sourcing policies mean that 90% of our specialist tree planting systems are manufactured within the United Kingdom, Canada, or the United States – in order to produce locally made product wherever possible.

We are here to support you right from the outset of your scheme. Our service covers every stage, from initial feasibility studies through to planting.

We live in times when the international debate on climate change has moved urban tree planting further up the political agenda. Local authorities and large corporations are being held accountable for climate mitigation strategies through the NI 188 reporting system and others. Tree strategies can play a vital role in meeting these goals.



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Planting a tree in the urban environment involves a huge change for that tree in terms of the habitat that it will have to adapt to, compared with that which it would normally enjoy in rural conditions.

Forest vs City



Kings Cross Station, London

Trees are forestry plants. As soon as we forget this simple fact we are likely to make mistakes when planting them in town and city environments.

The trees shown opposite are in a beautiful wooded setting and have near perfect conditions. Sheltered microclimate, rich fertile soil with an abundance of nutrients and humus, uncompacted leaf mould, rich rooting volume with plenty of moisture and pore space.

Now spare a thought for the tree in the town. A harsh paved surround, increasing microclimate temperatures and reflected glare, exposure to wind, de-icing salt and gratuitous vandalism.

Below ground an equally hostile environment of compacted soils, lack of

quality rootable volume, competition for space with multiple utilities and if the tree does manage to spread its root system someone will mutilate it, through trenching or pavement reinstatement.

With these factors in mind, we can begin the process of successfully integrating trees in built up areas. By protecting them above and below ground, managing and providing for delicate root systems, we can as far as possible recreate optimum conditions for our trees to establish.

We cannot recreate entirely the conditions trees enjoy in woodlands but we can go a huge distance in improving their chances of thriving in challenging conditions by tree literate design.



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How To Use This Design Guide

This manual is designed to logically guide you through the process of successfully planting urban trees. The format will assist you whether you are an experienced landscape designer or someone facing a new task or challenge.

1.0 Introduction

- The benefits of urban trees
- Trees and climate change
- Identifying opportunities for urban tree planting
- The process of successful tree pit design
- Pitfalls and challenges

2.0 Product Finder

Includes important information such as: typical installation specification, product specifications, compatible products, product codes and cross references to our tree pit details.

- ArborSystem
- Root management products
- Soil structure systems
- Soil range
- Tree pit irrigation & aeration systems
- Tree support
- Tree grilles and guards
- Tree pit surfacing
- Tree grates & street furniture
- ArborFlow
- WSUD products

3.0 Complete Tree Pit Systems

GBU range of standard tree pit system packages to suit different locations and budgets

4.0 Project Support and Advisory Service

- Specification support service
- NBS Plus
- GreenBlue Urban training centre
- CPD Service
- ArborSystem approved contractors scheme

5.0 The Trees

- Tree species lists
- Maintenance

6.0 Case Studies

- Selfridges
- Navy Pier
- Pace University
- Union Station
- Canary Wharf Crossrail
- Greener Grangetown
- Landsdowne Park
- St Peter's Square
- Sandwich Quay
- Goldhawk Road

7.0 Research Insights

- Re-excavated tree
- Root radar survey
- Leaf chlorophyll fluorescence testing
- Hadlow College Tree Pit Trials

8.0 GreenBlue International

- Partner companies
- International projects

9.0 Information

- Environment policy
- ArborAdvance
- Green Infrastructure valuation
- FAQ's
- How to order
- Data sheets
- Useful organisations

10.0 Index

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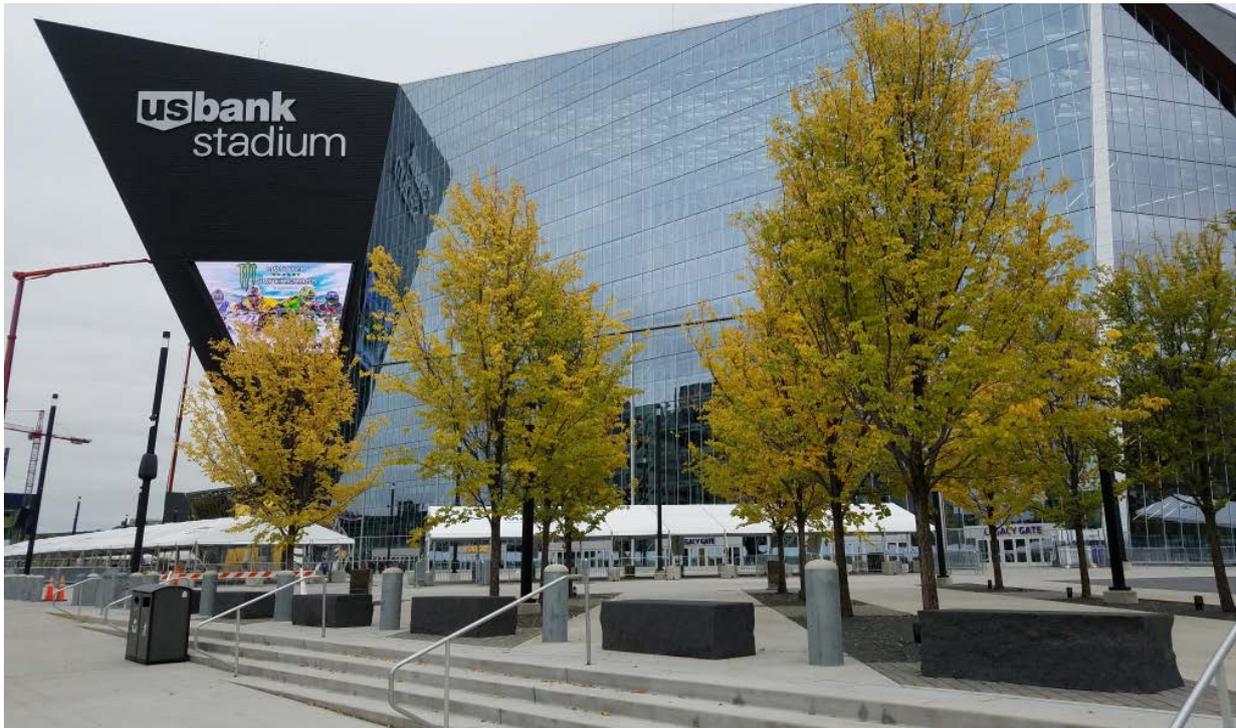
The Benefits of Urban Trees

Sadly, for many years now, the tree canopy in our towns and cities has been diminishing. Large mature trees which reach the end of their lives are frequently felled and replaced with smaller species or not at all. Replanted trees struggle to establish due to the demands of engineered surfaces around them.

However, as time has gone on, more and more research has confirmed the value and benefit of mature trees in urban environments. Charities and organisations such as 'Trees for Cities,' actively campaign in support of trees in urban areas.

Here we summarise some of the principle benefits that local authorities, developers, urban planners, architects and specifiers need to be aware of:

- **Aesthetics** - few things can compare with the visual impact and seasonal interest that a tree brings.
- For every **10%** increase in a city tree canopy, **ozone** is reduced by between **3-7%**.
- **Health** - trees have a **positive impact** on the incidence of skin cancer, asthma, hypertension and stress-related illness by filtering out polluted air, reducing smog formation, providing shade from solar radiation and giving an attractive, calming setting for recreation.
- One study by Natural England calculated that every £1 (\$1.30) spent on tree planting, would yield £7 (\$9) **savings**, which if taken nationally would amount to annual potential savings of £2.1 billion (\$2.7 bn).
- **Carbon reduction** - trees are proven to absorb carbon. Having removed it from the air it is stored as cellulose in their trunks, leaves and branches (a process known as sequestration). Planting trees remains one of the cheapest, most cost-effective means of drawing excess CO² from the atmosphere.
- A single mature tree can absorb **carbon dioxide** at a rate of 21.6kg (47.6 pounds)/ year and release enough **oxygen** back into the atmosphere to support 2 human beings.
- **Stormwater management and buffering** - the crown of a large tree is a free-standing anti-flood reservoir. One hundred mature trees capture about 1,137,500 litres of rainwater per year, allowing some to evaporate, drawing up more through the roots and slowly allowing the rest to soak into the ground.
- For every **5%** of tree cover in a community, stormwater runoff is reduced by **2%**.
- **Biodiversity** - the benefits of providing natural habitats for birds, squirrels and other fauna are incalculable.



US Bank Stadium - Minneapolis, MN, USA (Planted in 2016)

- Improves the **liveability** of urban areas.
- Trees can **increase real estate values**.
Independent studies show a consistent increase in property values in tree-lined streets between 5-15%.
- **Crime reduction** - researchers have discovered reductions in both violent and petty crime, including domestic violence through the therapeutic, calming influence of mature tree planting.
- **Pollutant removal** - Sulphur Dioxide, Nitrogen Oxides and particulates, Carbon Monoxide, Cadmium, Nickel and Lead are all substances that a tree will work to remove and store 24/7 365 days of the year.
- Research has shown a **60% reduction** in particulates from exhaust fumes etc in tree-lined streets.
- **Erosion reduction** - reducing topsoil erosion through runoff and preventing harmful chemicals from reaching watercourses.
- **Cooling effect** - reducing temperatures by both shade and transpiring water. This helps reduce air conditioning bills and energy use. One mature tree can produce the same cooling effect as **10 room-sized air conditioners**.
- **This same cooling effect** - becomes an effective tool in reducing urban heat islands and hot spots in cities.
- **Trees can save up to 10% of local energy consumption** through their moderation of local climate.
- **Noise reduction** - trees form an effective sound absorbing barrier.
- **Wind speed reduction** - buildings increase wind speed as wind is forced to travel further around them. Trees significantly reduce wind speed up to a distance of 10 times their height.
- **Managing traffic behaviours** - see case studies.
- **Security** - Strategic planting of larger species trees can provide protection for pedestrians in high risk environments, from vehicle movements.

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"If local authorities are to meet the stringent carbon reduction targets laid on them by 2020 and 2050, then trees need to be planted now!

Furthermore, these trees need to be planted in such a way that they stand a good chance of establishing well and reaching maturity."



The Old Bailey, London, UK

Trees and Climate Change

By signing up to international climate reduction targets, governments around the world have issued a challenge to everyone involved in urban space design. Whilst we cannot realistically claim that planting trees in cities and towns will significantly affect global climate, what we do know is that they have a major role to play in local climate mitigation and adaptation strategies.

Trees can, by providing shade and cooling through transpiration and evaporation processes, reduce temperatures around them. Clusters of well-established trees probably represent the most effective tool available to urban designers in combating urban heat islands and heat sinks in cities. These pockets of heat build-up in urban areas with solar energy and glare reflecting off engineered hard surfaces. These same surfaces store the heat and release it overnight, scarcely having time to cool before the next sunrise.

As mentioned earlier, one well-established tree can have the effect of 10 room-sized air conditioners – but of course from a totally sustainable, zero energy source!

The targets set for CO² reduction are extremely challenging – by 2020, a reduction of 1.2m tonnes of CO² per annum is looked for in the UK and by 2050 a reduction target of 80% of 2009 levels. With other countries committing to similar levels, trees can play an important part in implementing this reduction – but a lot needs to happen quickly.

How we can help...

- By assisting you in evaluating tree pit designs
- Providing guidance on best practice in tree pit layout and planting methods
- Giving you quality advice
- Providing detailed tree pit specifications and costing
- Supplying practical, cost effective products, to assist with tree establishment
- Site support when planting
- Contact greenblue.com or telephone UK: +44 (0)1580 830 800 or USA/Canada: 1-866-282-2743



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Identifying Opportunities For Urban Tree Planting

Clearly, we cannot just simply drop trees in anywhere. To have a chance of success, tree species and location are the first priority in our goal of establishing trees in towns. Planting potentially large trees in wrong locations is counterproductive and will simply turn people against trees.

However, equally often we see tree planting sites which could support larger species, populated with smaller 'whitebeam' or 'prunus' species which really represent a lost opportunity. Big trees bring big benefits but they must be located wisely.



Right tree, right place

Trees need space, they need soil volume - there is a direct correlation between the provision of adequate root environment and the achievement of canopy potential.

Architects and engineers would never seriously consider building a structure with inadequate foundations and yet many will routinely plant trees on their schemes in tiny tree pits just a fraction of what they really need to do well.

Where possible, plant trees in groups with shared soil space. Trees can then spread out happily between themselves and benefit from additional soil volume. One common method is the use of continuous trench planting and this is a very good way of providing adequate volume.



Large car parks without trees: urban hot spots and missed opportunities.



Successful tree planting, with no reduction in parking space.

Consider planting trees in the following locations:

- **Build-outs in road schemes** – one of the most demanding places to plant a tree but one in which successful established trees have a huge impact. These can be used as part of traffic calming projects (thus fulfilling two roles in one), or simply parking delineation.
- **Verges** – the most common area for urban tree location.
- **Pavements** – demanding on the tree but can be achieved successfully with careful attention to tree pit design.
- **Car parks** – again a potentially hostile place to plant a tree but greatly beneficial in providing cool shade for vehicles in bright weather.
- **Plazas** – these are where trees can really have huge aesthetic and beneficial impact – there is nothing else that can be incorporated in these kind of spaces that will confer the same degree of benefit.
- **Parkland** – Few things can compete with established trees in a park setting – indeed try imagining a park without trees.
- **New forest pockets** – creating tree clusters in urban spaces and pocket parks is an excellent strategy to increase tree canopy for climate mitigation and adaptation.
- **SuDS/LID** – Consider the use of trees as part of a stormwater retention strategy – SuDS / LID tree pit designs are now workable.

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The Process of Successful Tree Pit Design

Having made a decision on species and location, the following process should be observed when designing the exact profile of the tree pit and ancillaries:

- **Available root space** - Soil volume requirements for trees can be estimated using several methods. As stated earlier, in a natural environment a root system can extend two to three times the radius of the tree canopy.

Probably the simplest way of calculating a minimum required soil volume is to take the projected canopy area of the mature tree, multiplied by a depth of 0.6m (2 ft). The shape of this area can be configured to suit the particular site. Other methods are based on mature trunk girth and are possibly more

accurate as they provide for different foliage shapes. The old method of providing an area the size of the pavement opening is clearly insufficient, and commits the tree to an untimely death, or a lifetime of costly repairs.

- **Engineering requirements** - With many trees being planted immediately adjacent to highways and engineered structures, it is vital that root volume beneath or around such is considered.



Canary Wharf Crossrail, London, UK



St Peter's Square, Manchester

- **Root management** – paved surrounds or utilities nearby? If so, root management should be specified depending on what needs protecting and where it is in relation to the tree. For continuous paved surround for example, roots will need managing downwards by at least 300mm (11.8") to design out paving heave. See our section on root management for further details.
- **Irrigation** – lack of water and nutrients are the biggest single killers of newly planted trees. It is very important to incorporate the means to irrigate efficiently, particularly for the first three years.
- **Drainage** – water logged tree pits can become anaerobic and this will kill the tree – please ensure that potential drainage issues have been addressed early on in your scheme.
- **Aeration** – less widely known but none the less important, soils and roots need air to live. If the root plate of the tree is covered with impervious paving, vital gaseous exchange in the root zone cannot take place. Appropriate tree pit design should include a means of facilitating air supply below ground.
- **Support** – how will you ensure the tree is securely located? Underground guying is widely favoured for urban areas as it is unobtrusive. Staking and tying is an alternative but this will require maintenance.
- **Above ground** – What sort of environment will you be planting in – in some locations above ground protection from carelessness and/or gratuitous vandalism becomes critical to tree survival. A decision will need to be made on whether there is a need for tree grilles, vertical guards and other protective measures.

Having considered and provided for all the above items, we are well on the way to ensuring that our tree planting programme is going to be efficient and successful. The above factors cover well over 90% of the reasons for urban tree failure. We now need to look at the specific products required to help us design these features into our schemes.

Pitfalls and Challenges

Each of these photographs tell a story. Learning from both our own and others' mistakes is imperative if we are to pursue the goal of increasing urban tree canopy cover.



A healthy tree: With the right product selection urban trees can thrive.



Inappropriate product selection can blight the result.



This guard is killing the very article it was supposed to protect.



A healthy tree: With the right product selection urban trees can thrive.



A healthy tree: With the right product selection urban trees can thrive.



Makeshift and untidy - a home for rats and mice.



Surface root heave.



Insufficient rooting volume - after a good start these trees exhausted available soil.



Poor planting techniques harm trees.



Poor drainage can kill.



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1



Product Finder

Below Ground

■ ArborSystem	29
■ Root Management	30
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■ Soil Range	51
■ Irrigation & Aeration	59
■ Underground Guying	70



Trees as **landmarks**
can give a community
a new identity and
encourage civic pride.

ArborSystem

The definitive urban tree pit package

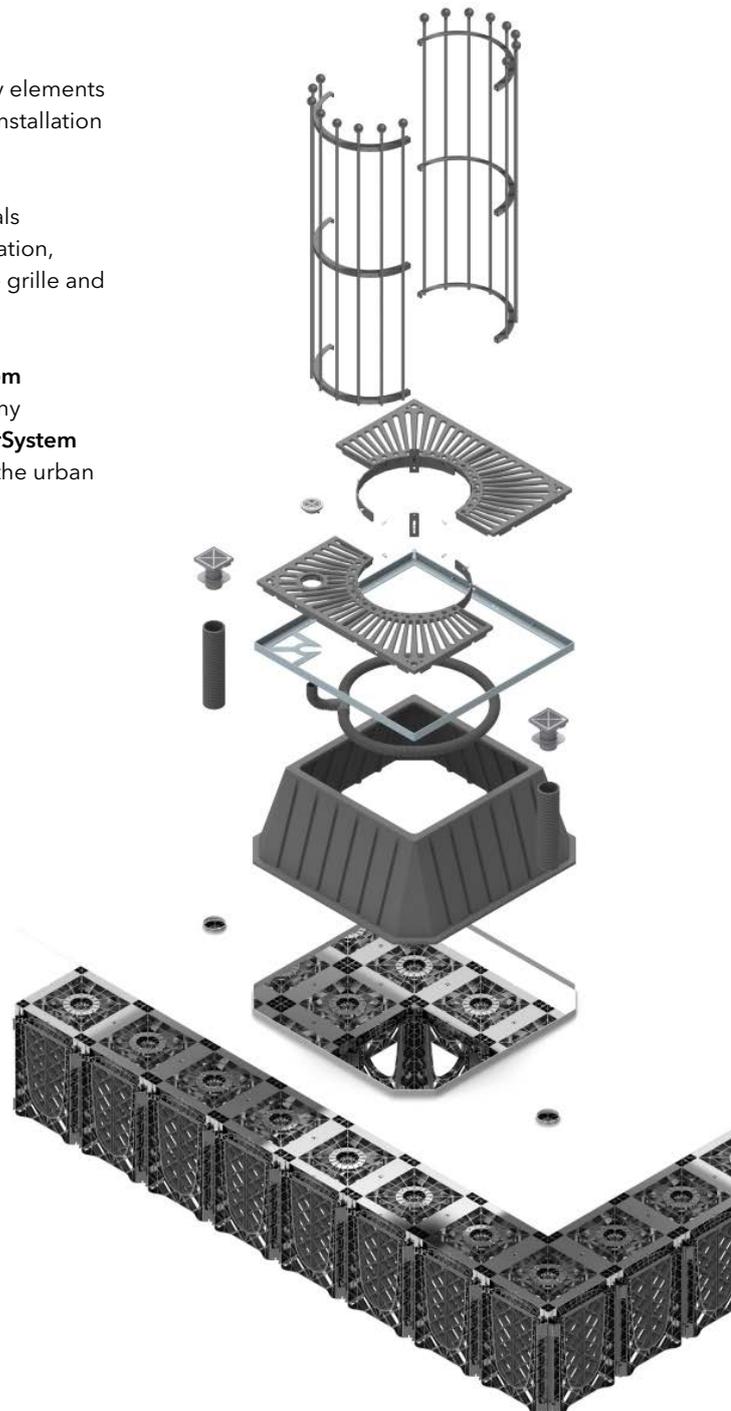
The **GreenBlue Urban ArborSystem** brings together the key elements of successful tree pit design and simplifies the design and installation process for specifiers and installers.

By using our USB drive or hard copy, landscape professionals can combine root management, load-bearing soil cells, aeration, irrigation and choose an appropriate above ground surface grille and vertical guard – in a single package.

Continuous development over recent years, the **ArborSystem** integrated tree pit product package has proved itself in many demanding locations. For many landscape specifiers, **ArborSystem** has become the system of choice for integrating trees into the urban environment.

By utilising ArborSystem, landscape designers can:

- Ensure product compatibility
- Drastically reduce time spent on specifying, quoting and ordering
- Adapt a system to suit differing location and budget constraints
- Demonstrate to clients a professional long-term approach to tree planning and management issues
- Benefit from our on-site support service for peace of mind



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Root Management Products

Overview

With today's clients requiring 'complete life costing' and 'duty of care' obligations, it is no longer sufficient to plant a tree in an urban location, simply hoping that the roots will keep out of trouble. This guide sets out current 'best practice' in tree root management.

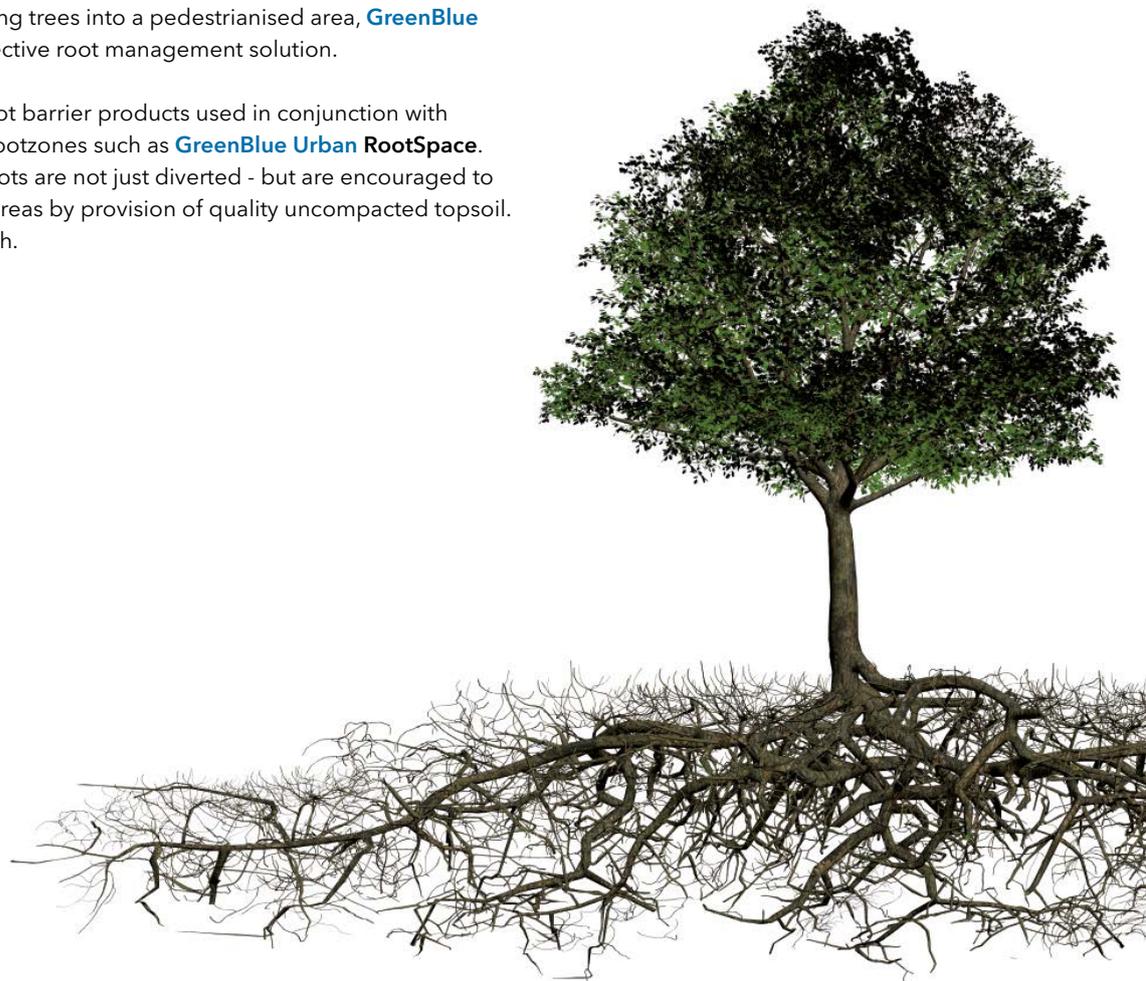
GreenBlue Urban has developed a range of specialist root management products. Different situations often require a different approach.

Rather than take a 'one size fits all' attitude we have designed our root management range to give the tree as much growing advantage as possible.

Therefore, if one is simply wanting to protect paved surfaces from root heave, it is unnecessarily restrictive on the tree to install a vertical sheet barrier 1.5m (5 ft) deep all round. The **RootDirector** product diverts roots downwards to a level where they can safely establish without surface damage.

So, whether designing a root free corridor for utilities, protecting building foundations or designing trees into a pedestrianised area, **GreenBlue Urban** has the cost-effective root management solution.

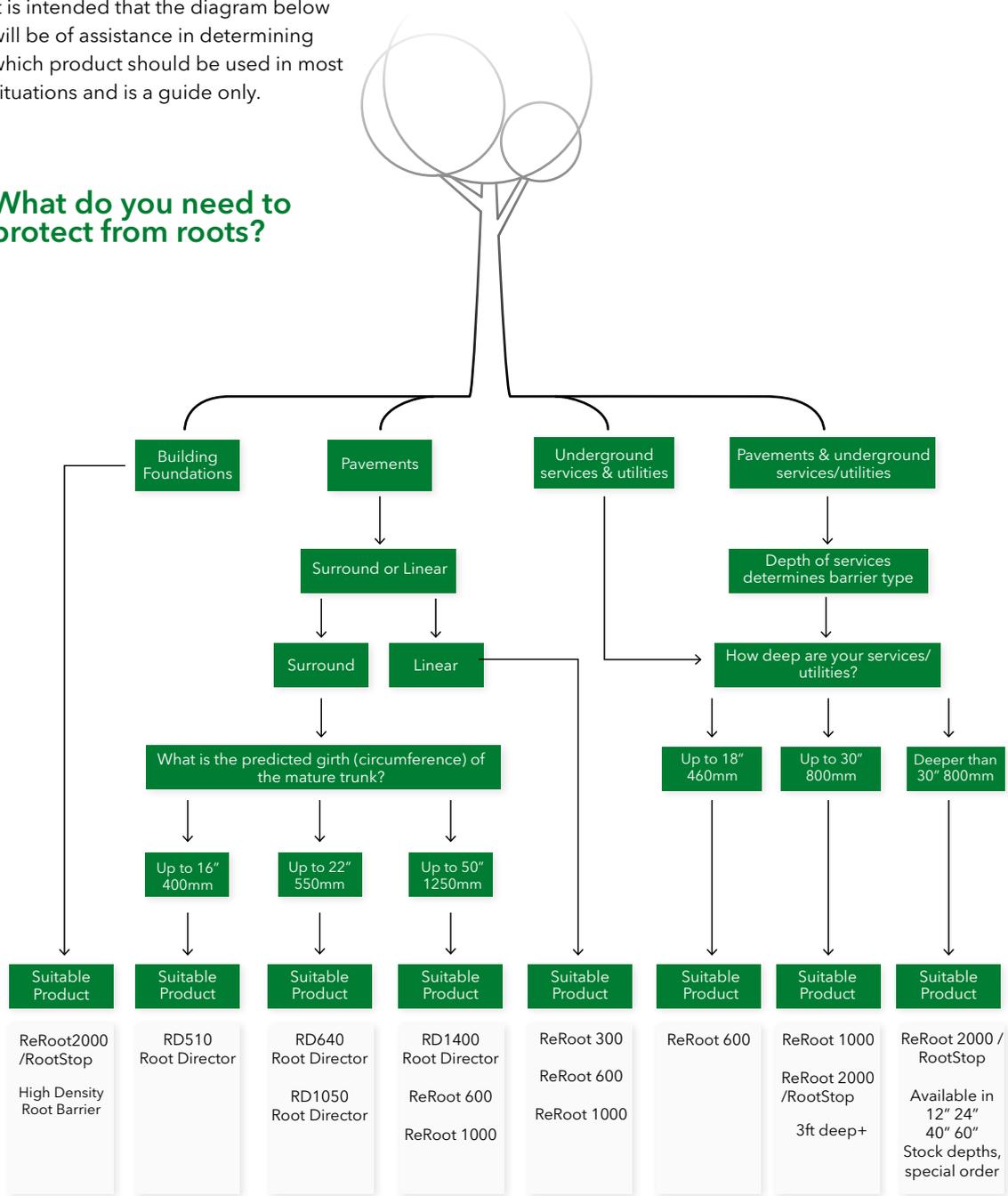
Increasingly, we see root barrier products used in conjunction with provision of 'optimal' rootzones such as **GreenBlue Urban RootSpace**. This means that tree roots are not just diverted - but are encouraged to establish in preferred areas by provision of quality uncompacted topsoil. A truly holistic approach.



Root Management Selection Chart

It is intended that the diagram below will be of assistance in determining which product should be used in most situations and is a guide only.

What do you need to protect from roots?



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ReRoot 300/600/1000

Linear pavement protection



ReRoot 300, ReRoot 600 and **ReRoot 1000** products are ribbed root barriers designed for the protection of paved surfaces, shallow service ducts and utilities.

Available in roll form and in two different depths. The numbers 300, 600 and 1000 denote the depth in mm.

This versatile root management system can be used to surround individual or groups of trees because the ribs are proven to divert lateral root growth downwards.

Benefits

- Easy to install, no specialist equipment needed
- Available in 300mm (11.8"), 600mm (23.6") and 1000mm (39.4") depth
- Supplied in roll form to any 10 lin.m (32.8 ft) increment
- Ribbed construction prevents root swirl and directs roots downward and outward
- Flexible design allows the barrier to curve around obstacles but is rigid enough to hold its form when backfilling
- **ReRoot** jointing tape will ensure root proof joints when joining roll ends
- Manufactured from 100% recycled material

Typical Installation Specification

Install **ReRoot 600** linear root barrier with integral root deflecting ground lock ribs as follows:
Excavate narrow trench to a depth of 600mm (23.6"). Ensure that the base of the trench is firm and level.



ReRoot 300, 600 & 1000 are protected by patent (Patent no. 2311309) as the only roll form root barrier with integral root deflecting ribs.

Many local authorities now state in their planning policy that trees planted in soft areas within 3m (9.8 ft) of a paved/hard surface, that will be adopted by the council, must be lined with a root barrier. This protects the pavement in the long term and the trees' root system in the event of pavement excavation.



ReRoot 1000 installed to protect underground services and divert roots beneath pavement surfaces into the preferred rooting area.



Investment at planting stage will prevent costly root damage to pavements.



Typical project, three years after planting.

Product specification and codes		
Code	Product	Thickness
RER300A	ReRoot 300	1.0mm (0.04")
RER600A	ReRoot 600	1.0mm (0.04")
RER1000A	ReRoot 1000	1.0mm (0.04")
RERJTA	ReRoot Joint Tape 10m roll (32.8 ft)	-

Remove any sharp objects from close proximity to the trench walls. Install root barrier with the ribs facing the tree roots. Backfill the tree side with good quality topsoil and the rear side of the barrier simultaneously with subsoil allowing for surface finishing - kerbing etc.

Backfilling should be in layers. Concrete is permissible on the rear side of the barrier if required to support hard landscape surface. Care should be taken to remove any sharp objects from the backfill material. The top edge of the root barrier must remain 10mm (0.39") above the surface tree side. To join roll ends tape both sides with **GreenBlue Urban ReRoot** jointing tape.

For ReRoot 300 & ReRoot 1000, only the excavation depth differs from the above.

Compatible 'ArborSystem' Products

- Tree pit irrigation. Page 59
- Soil structure systems. Page 40
- Root ball guying and ties. Page 70
- Tree grilles and guards. Page 81

Standard Tree Pit Details

To clearly illustrate correct product application, please refer to our standard tree pit details which are in the tree product packages section.



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ReRoot 2000/RootStop

Deep application root barrier



ReRoot 2000/RootStop was specified and installed at this industrial park at Speke, Liverpool. Note how trees have been planted parallel to a major gas main with the approval of Transco.

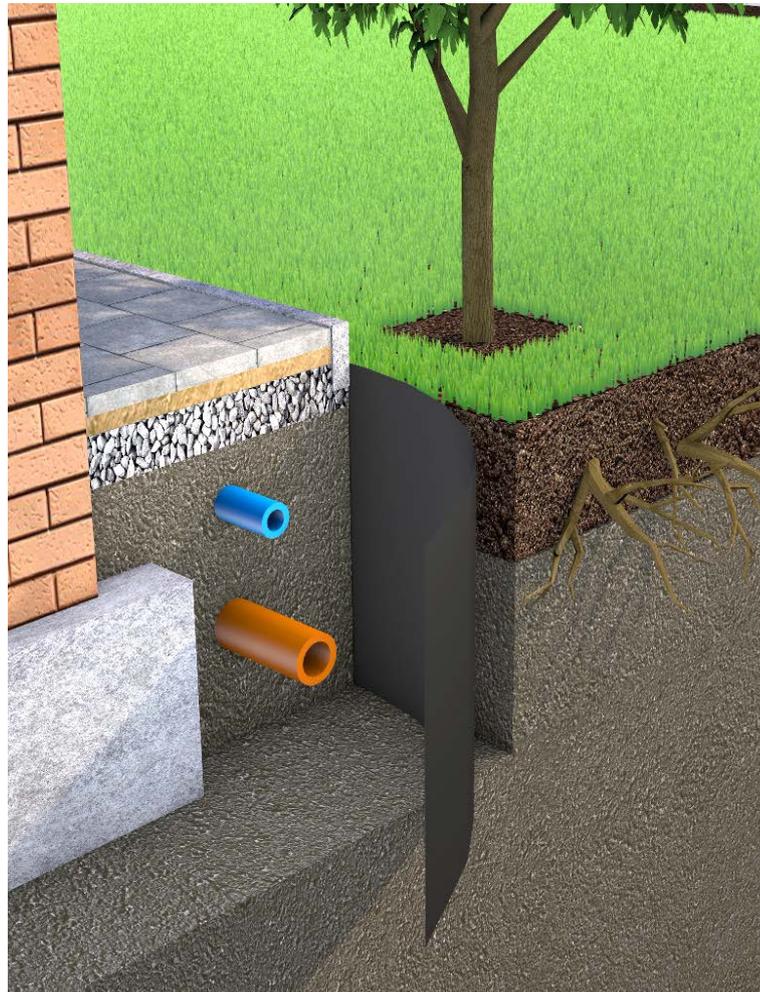
ReRoot 2000/RootStop is a high strength root barrier for deeper applications. This product has been used extensively on many projects, particularly in new service infrastructure projects, business parks and housing developments.

ReRoot 2000/RootStop is rigid enough to hold its form when placed into a trench. This is a big advantage as it will not be dragged downward during backfilling. Market leading puncture resistance and strength, mean that this is the root barrier of choice for specifiers and utility companies requiring root free service corridors.

The high puncture resistance of **ReRoot 2000/RootStop** allows easier compaction close to the barrier ensuring an excellent product/soil interface.

Benefits

- Resistant to puncture by sharp objects or tearing as a result of soil movement
- Durable, resistant to biodegradation and photodegradation
- Easy to install, no specialist equipment needed
- Available in standard 0.6m (2 ft), 1.0m (3.3 ft), 1.5m (4.9 ft) and 2.0m (6.6 ft) depth rolls
- Supplied in roll form to any 10 lin.m (32.8 ft) increment
- Available in 1.0mm (0.04") and 2.0mm (0.04") thickness
- Effective in the control of Japanese Knotweed and other invasive plants
- **ReRoot 2000/RootStop** fulfils all the Arboricultural Advisory and Information Service guidelines for root barriers
- Manufactured from 100% recycled material
- HDPE





ReRoot 2000/RootStop can be used to keep tree roots from damaging services and paved areas.



ReRoot 2000/RootStop installed to protect hard surfaces at Granton, Edinburgh.



ReRoot 2000/RootStop will hold its form in a trench excavation. This makes installation quick and easy. Also visible is land drain to remove groundwater pressure.



ReRoot 2000/RootStop has been installed prior to topsoiling in this infrastructure project.

Product specification and codes

Code	Thickness	Depth
RER210X0.6A	1.0mm (0.04")	600mm (23.6")
RER210X1.0A	1.0mm (0.04")	1000mm (39.3")
RER210X1.5A	1.0mm (0.04")	1500mm (59")
RER220X1.0A	2.0mm (0.08")	1000mm (39.3")
RER220X1.5A	2.0mm (0.08")	1500mm (59")
RER220X2.0A	2.0mm (0.08")	2000mm (78.7")
RERJTA	ReRoot Joint Tape 10m roll (32.8 ft)	

Typical Installation Specification

Install **ReRoot 2000/RootStop** (including relevant product code) linear root barrier as follows:

Excavate narrow trench between the tree and the structure to be protected. Please note: the positioning of the trench will depend on tree species and other site conditions. Please consult a qualified arboriculturist.

The barrier should be positioned in the trench against the side of the trench nearest the tree. Any sharp objects should be removed from the trench walls and the backfill material.

ReRoot 2000/RootStop roll ends can be joined by overlapping at least 500mm (19.7") and securing both sides with **GreenBlue Urban** root barrier jointing tape. For critical applications the material can be seam welded.

Ensure that the top of the barrier finishes at least 10mm (0.4") above finished soil levels tree side, to avoid subsequent root overgrowth. The barrier can be trimmed using a sharp knife. Backfill the trench in layers, compacting carefully.

It may be desirable, depending on site conditions, to encapsulate the top edge of the barrier in concrete haunching to protect the barrier and to finish the installation tidily.



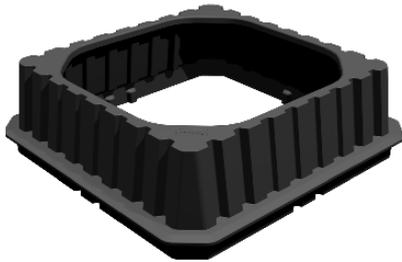
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RootDirector

Preformed root protection system



RootDirectors are of robust construction and can be easily handled on site.

Designed for the protection of pavements and hard landscaped areas, the ribbed **RootDirector** system prevents root swirl and diverts root growth downward and outward thus avoiding the unsightly and hazardous root damage so commonly seen in urban areas.

The **RootDirector's** rigid, one-piece construction makes installation simple. As a product within the '**ArborSystem**' range, it is compatible with the **RootRain** irrigation system, **GreenBlue Urban** load-bearing soil cell systems and our extensive tree grille and guard range.

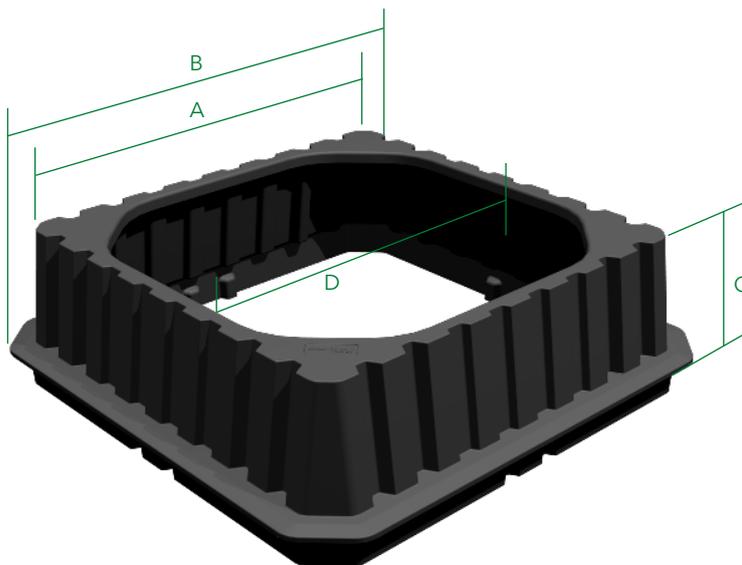
Benefits

- Protection for paved surrounds
- Encourages deep root growth
- Improved drought tolerance
- Lightweight design allows for easy manual handling
- Greatly enhanced tree stability
- Integral ribbed construction which prevents root swirl
- Optional irrigation facility
- Compatible with **GreenBlue Urban ArborSystem** products
- Simple to install
- 100% recycled plastic





RootDirectors are the ideal root management solution for individual tree planting schemes, and were used in both the above projects. Used here in a project in Northwood Hills, Hillingdon, London.



Product specification and codes

Code	A	B	C	D
RD510A	510mm (20.1")	595mm (23.4")	310mm (12.2")	425mm (16.7")
RD640A	630mm (24.8")	885mm (34.8")	455mm (17.9")	575mm (22.6")
RD1050A	975mm (38.4")	1370mm (53.9")	545mm (21.5")	860mm (33.6")
RD1400A	1300mm (51.2")	1050mm (41.3")	500mm (19.7")	1200mm (47.2")
RD1000-RSA	888mm (35")	1050mm (41.3")	250mm (9.8")	800mm (31.5")
RD1500-RSA	1388mm (54.6")	1550mm (61")	250mm (9.8")	1300mm (51.2")

Typical Installation Specification

Install **RootDirector** preformed root barrier system with integral root deflecting ribs.

Excavate planting pit to accept **RootDirector**. Ensure adequate drainage to pit. If using in conjunction with soil cells, these should be installed first.

The lower flange of the **RootDirector** should be level and on a firm even base to avoid settlement. Ensure top edge of **RootDirector** is level with finished surround unless installing with a tree grille. If a tree grille is being used, check depth of support frame.

Backfill inside and outside simultaneously, firming in 150mm (5.9") layers. Topsoil inside the **RootDirector** should not overflow the top flange.

Compatible 'ArborSystem' Products

- Tree pit irrigation. Page 59
- Soil structure systems. Page 40
- Root ball guying and ties. Page 70
- Tree grilles and guards. Page 81

Standard Tree Pit Details

To clearly illustrate correct product application, please refer to our standard tree pit details which are in the tree product packages section.



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RootForm

High strength root director for structural tree pits



Benefits

- Prevents root heave in surrounding surfaces
- Encourages deeper root growth for improved tree stability and drought resistance
- Concrete haunch provides structural integrity and lateral stability
- Ribbed design prevents root swirl
- Modular design allows for quick and easy installation
- ArborSystem compatible
- Recycled plastic

RootForm is a root management product for guiding roots to deeper profiles. The hollow sections are designed to be filled in situ with a concrete or similar structural fill material giving very high strength. Strength can be further increased by incorporating steel reinforcing within the concrete infill.

The product once installed is ideally suited to carpark and other road situations where granular road base material is to be used alongside the tree pit.

GreenBlue Urban recommend that this product is used with a load-bearing soil structure at its base such as **RootSpace** or **StrataCell**.

Modular construction gives flexibility on tree pit opening dimensions. 300mm (11.8") and 500mm (19.7") standard sections allow for 1000 (39.4"), 1200 (47.2"), 1500 (59.1"), 1800 (70.8") openings and beyond, giving the designer scope to create optimal opening size for the tree species selected, and the space available.



Typical Installation Specification

Supply and install hollow interlocking sectional root management system with integral root deflecting ribs. Once located, infill the root management system in accordance with the manufacturer's instructions, with concrete to engineer's specification.

Product codes and specification

Codes	Description	Max Root ball diameter
RF4-10A	Complete RootForm assembly 1.0m ² (35.3 ft ³)	600mm (23.6")
RF4-12A	Complete RootForm assembly 1.2m ² (46.4 ft ³)	800mm (31.5")
RF4-15A	Complete RootForm assembly 1.5m ² (64.8 ft ³)	1100mm (43.3")
RF4-18A	Complete RootForm assembly 1.8m ² (85.3 ft ³)	1300mm (51.2")
RF4-20A	Complete RootForm assembly 2.0m ² (99.8 ft ³)	1500mm (59")



St Peter's Square, Manchester, UK

Soil Structure Systems

RootSpace & StrataCell

What is soil structure?

Soil structure is the arrangement of soil particles, including silt, sand and clay that aggregate together and the pore spaces between them. It is soil structure which supports trees and plants and gives them foundation and stability.

Why do we need soil structure systems?

Not every soil structure is conducive to the growth of plants and trees. Tree growth and fertility are strongly influenced by soil structure, as it affects the movement of air, water and other nutrients required for trees to flourish. Effectively the 'architecture of the soil', soil structure is usually the most critical element for the success, or failure, of the urban tree to grow and thrive. A well-structured soil functions like a reservoir, enables the tree to accept, store and transmit water, nutrients and energy, providing room in which roots can propagate and allowing the space it needs for life and the necessary biochemical exchanges for growth. Too often trees are planted in cramped planting pits and in poor subsoil, resulting in retarded growth, with roots tending to colonise the area immediately underneath the paved surface, leading also to structural pavement damage. Paved surfaces require solid, compacted ground for pedestrian movement and vehicular traffic. Without compromising or damaging the structural integrity of paved surfaces, how can urban trees be adequately provided for in their urban setting?

How do they work?

Soil in urban areas rarely provides the favourable environment for trees to grow and flourish. Hard compaction, lack of aeration, poor drainage, low nutrient levels and the existence of pollutants in soil structures retard root growth and make it almost impossible for urban trees to grow and thrive. [GreenBlue Urban](#) offers landscape architects, engineers and arborists strong soil structure systems that, while conducive to root growth, also give adequate support for roads and pavements.



RootCell (2001)



StrataCell (2007)



RootSpace (2016)

RootSpace Introduction

RootSpace® is the next generation soil protection product, developed by **GreenBlue Urban** to reduce cost, cut down installation time, and incorporate industry-leading soil aeration methodology – a vital and often overlooked component in tree pit design.

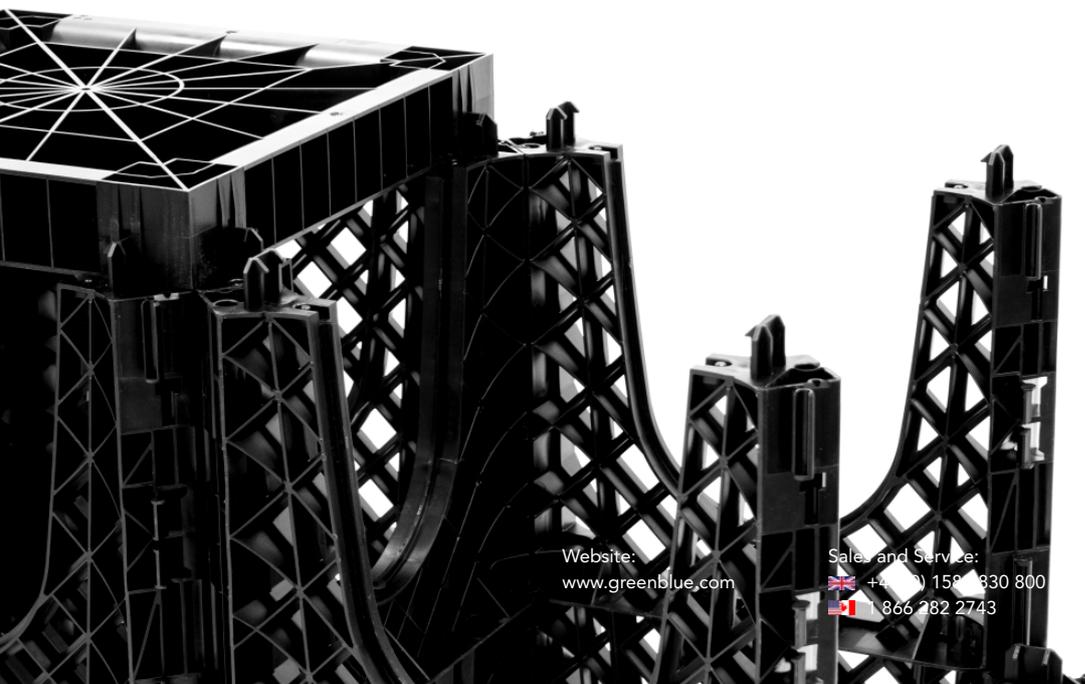
We have developed the **RootSpace** soil panel system – taking the benefits of previous soil cell systems and improving functionality – making long-term root zone construction more affordable for any size project.

For civil engineers, **RootSpace** represents class-leading strength and unique lateral stability benefits.

For foresters and arboriculturalists, **RootSpace** gives optimal aerated soil volumes for unimpeded root growth.

For utility companies, **RootSpace** offers the first tree soil support system designed to allow retro access to services running through the tree root zone.

For developers and contractors, **RootSpace** gives the fastest assembly and filling times – with the added attraction of competitive product cost and **GreenBlue Urban** site support.



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The image shows a modern urban street with a wide, paved sidewalk. A large, young tree with vibrant green leaves stands prominently on the left. The sidewalk is composed of light-colored paving stones. In the foreground, a cross-section diagram reveals the tree's root system and the underlying infrastructure. The tree is planted in a raised bed of soil, which is supported by a series of dark, rectangular, perforated plastic modules. These modules are arranged in a grid pattern, allowing for water drainage and root growth. A yellow pipe is visible within the modules, likely for irrigation. The background shows a row of brick buildings with various shops, including 'M&Co.', 'Cex', and 'Queerz Nails'. People are walking on the sidewalk, and cars are parked along the street. The sky is clear and blue.

Integrates with other
ArborSystem products such
as:

- ArborVent
- RootDirector
- RootForm
- ArborFlow 100
- ArborGuy

RootSpace

The next generation soil support system for optimal tree root environments

The **GreenBlue Urban RootSpace** system is essentially a soil support system – designed for maximum soil and rooting volume, to be ‘utility friendly’, with economic freight and industry-leading strength characteristics.

In 2001, **GreenBlue Urban** produced the world’s first purpose-made commercial load-bearing soil cell for urban tree planting. Since that time, thousands of trees have benefited and continue to benefit, from access to uncompacted soil volumes – beneath heavily engineered pavements and roadways.

RootSpace – **GreenBlue Urban’s** new soil support system, gathers up all the years of experience as leaders in the field, to offer the definitive urban tree root protection product.

Essentially, urban tree success is all about the soil the tree is planted in – a large volume of uncompacted, good quality soil is required for the establishment and long-term health of a tree in paving.

Key Benefits

- Interlocking recycled material panels give huge strength
- Open structure – fast filling and class-leading soil void ratio – more soil for the tree
- Fast installation reduces labour costs
- Less plastic – reduces costs
- Unique patented Airflow lid – encourages the movement of air allowing the soil to breathe
- Excellent space provision for integrating utilities
- Lid designed to allow fast re-excavation for utility emergencies
- Open lattice – high strength but maximum soil space



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Predict – how much soil your tree will require as it matures

Provide – give the tree enough quality uncompacted soil in zones into which it can freely spread its roots

Protect – Look after the vital soil structure itself – overcome potentially fatal compaction of the soil and ensure access to drainage and ventilation.

RootSpace 400 & 600 Upright



Interlocking high strength vertical panel – designed for fast location and connection with neighbouring panels to build extensive structures quickly.

RootSpace Airflow QR (Quick Release) Top



Designed to allow air movement over the soil profile, fast interconnection with neighbouring cap and class-leading structural strength. Central aperture designed to collect debris and diffuse water flow into soil zone, reducing potential for water flow erosion.

RootSpace 400 & 600 Infill



RootSpace is the only load-bearing soil system to provide an optional side panel for increased stability against lateral ground movements. Can be used around the perimeter of the installation where there is a likelihood of post-planting subterranean ground settlement.

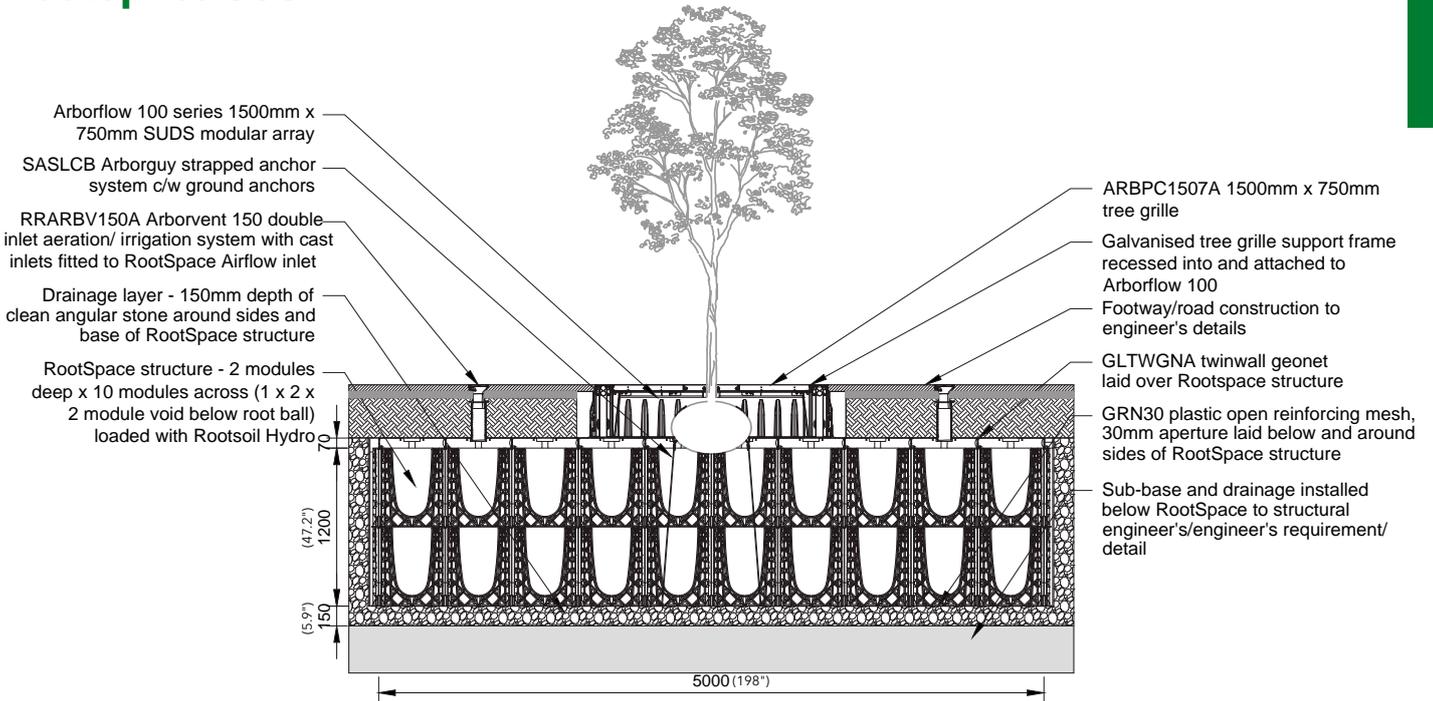
RootSpace 600

Code	Configuration m ²	Soil Depth
GBURS61A	RootSpace 600 - 1 Deep	600mm (23.6")
GBURS61IA	RootSpace 600 - 1 Deep (with infills)	600mm (23.6")
GBURS62A	RootSpace 600 - 2 Deep	1200mm (47.2")
GBURS62IA	RootSpace 600 - 2 Deep (with infills)	1200mm (47.2")

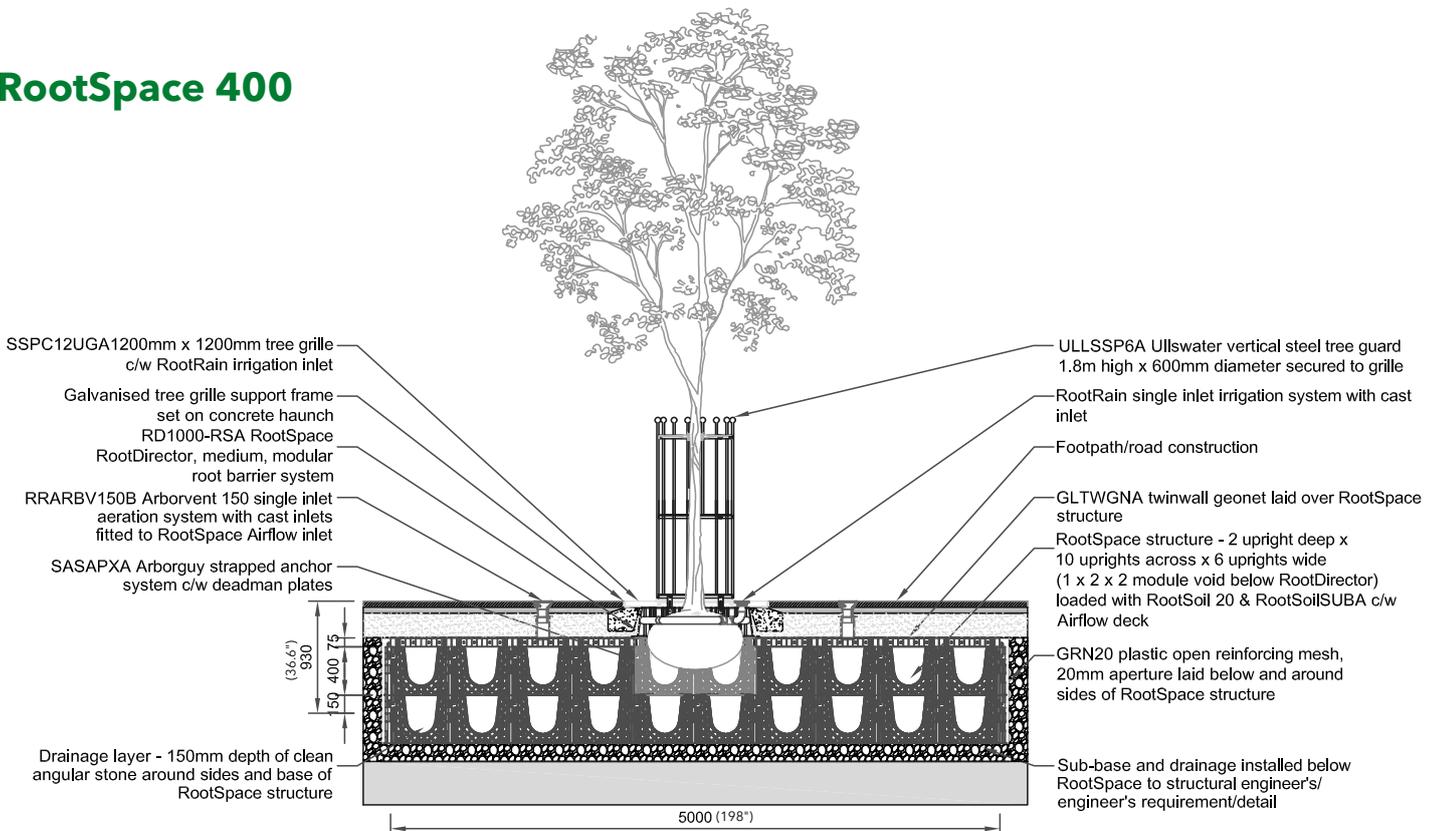
RootSpace 400

Code	Configuration m ²	Soil Depth
GBURS41A	RootSpace 400 - 1 Deep	400mm (15.7")
GBURS41IA	RootSpace 400 - 1 Deep (with infills)	400mm (15.7")
GBURS42A	RootSpace 400 - 2 Deep	800mm (31.5")
GBURS42IA	RootSpace 400 - 2 Deep (with infills)	800mm (31.5")

RootSpace 600



RootSpace 400



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StrataCell

Soil structure system

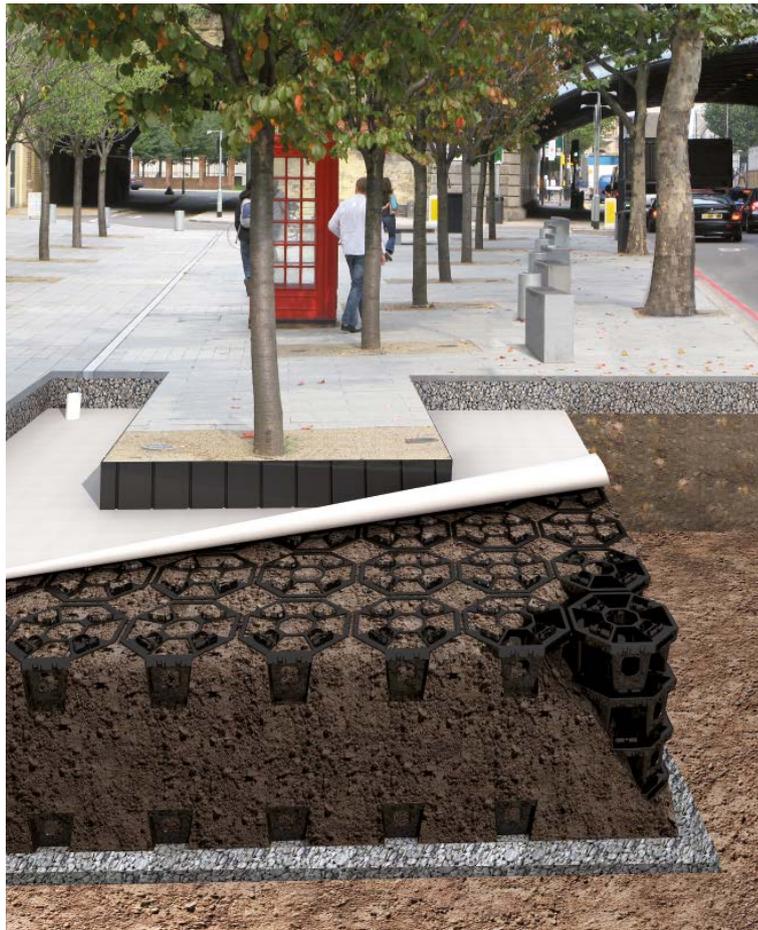


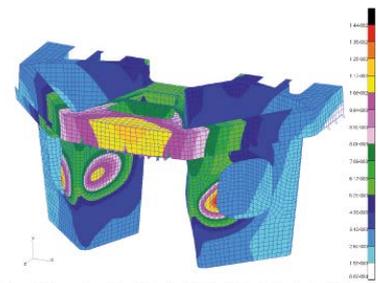
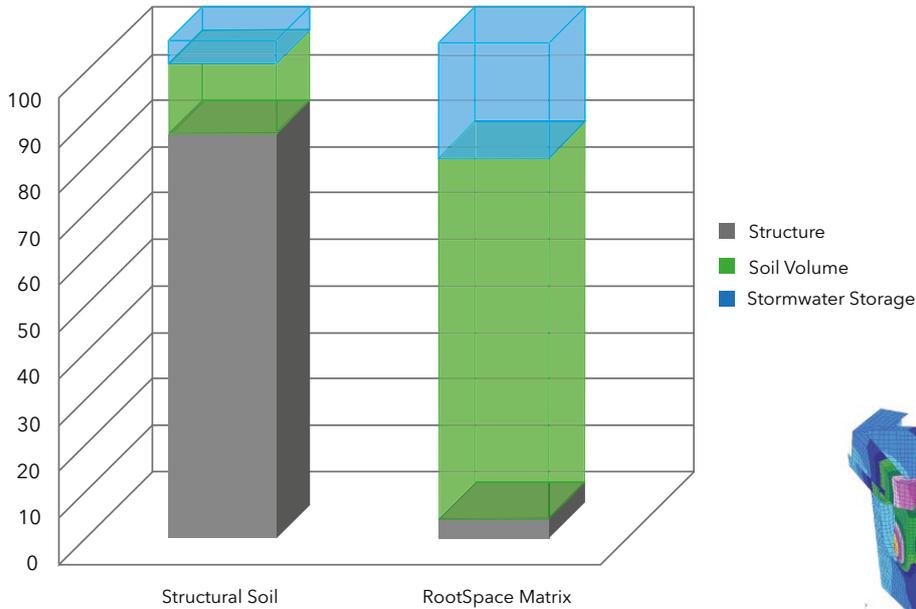
Designed to highly advanced engineering specifications to support greater vertical loads, **StrataCell** brings tree-root systems closer to pavement surfaces. Engineers have calculated that, with only 300mm (11.8") of granular pavement depth, a **StrataCell** matrix can support maximum traffic loads.

With vertical and lateral forces also considered in the engineering make-up of tree pits, **StrataCell's** well-designed matrix units lock together well, forming a monolithic framework with excellent modular strength. Highly secure connectors allow for **StrataCell** modules to click together fast and simply.

Benefits

- Designed to support enormous vertical as well as lateral loads
- Excellent modular strength
- Integrated matrix means modules are simple and fast to click together
- In excess of 94% of total soil volume is available for tree-root growth
- Generously designed apertures permit common conduits, service pipes and aeration systems
- Significant volume reduction for freight and lower transport costs
- Reduced installation costs
- Constructed from 100% post-industrial waste material





Extensive computer modelling and laboratory testing have established **StrataCell** as the strongest large soil cell.

Its open and skeletal structure provides an enormous growth zone for delicate root systems, with in excess of 94% of the soil volume allocated for tree-root growth. These high soil-volume tree pits are distinctly more advantageous for trees as optimum conditions for nature and nurture are recreated for trees to live and flourish.

StrataCell apertures are built to generous specifications, permitting common conduits, service pipes and aeration mechanisms to be incorporated into the structure’s design.



Large void space between columns.





Typical Installation Specification

Please contact **GreenBlue Urban** for full installation specification.

Compatible 'ArborSystem' Products

- Root management. Page 30
- Underground root ball guying. Page 70
- Tree grilles and guards. Page 81
- Porous resin bound gravel. Page 96

Standard Tree Pit Details

To clearly illustrate correct product application, please refer to our standard tree pit details which are in the tree product packages section.

StrataCell Module specification (60 series)

Description	Recycled plastic rigid skeletal interlocking octagonal structure
Material	Advanced glass reinforced polypropylene
Dimensions	500mm (19.7") x 500mm (19.7") x 250mm (9.8")
Loading capacity	550Kpa vertical load

Cell configurations

Code	Configuration	Soil Depth
GBUSC601A	StrataCells (60's) 1 Deep	250mm (9.8")
GBUSC602A	StrataCells (60's) 2 Deep	500mm (19.7")
GBUSC603A	StrataCells (60's) 3 Deep	750mm (29.5")
GBUSC604A	StrataCells (60's) 4 Deep	1000mm (39.4")

StrataCell Module specification (30 series)

Description	Recycled plastic rigid skeletal interlocking octagonal structure
Material	Recycled polypropylene
Dimensions	500mm (19.7") x 500mm (19.7") x 250mm (9.8")
Loading capacity	260Kpa vertical load

Cell configurations

Code	Configuration	Soil Depth
GBUSC301A	StrataCells (30's) 1 Deep	250mm (9.8")
GBUSC302A	StrataCells (30's) 2 Deep	500mm (19.7")
GBUSC303A	StrataCells (30's) 3 Deep	750mm (29.5")
GBUSC304A	StrataCells (30's) 4 Deep	1000mm (39.4")





GreenBlue Urban Planting Mediums

Soils and soil mixes available in the UK

In the long term, urban tree health is inextricably linked to the soil the roots are growing into. **GreenBlue Urban** have made a study of this subject and our goal is the provision for the urban tree of a soil which mirrors, as closely as possible, a ‘forest floor’ soil condition and content.

Our studies have led us to excavations in natural forests as well as urban tree planting sites around the UK, seeking out the most favourable rooting conditions – and their common characteristics. This has revealed that uncompacted, free draining fertile loam soil is the most root friendly substance on the planet.

Sand alone is not sufficient – or the Sahara would not be a desert. Rocky terrain likewise – without soil in, is not conducive to a healthy long-term rooting structure. Roots in rock soil substrate mixtures, tend to be artificially elongated as they have to travel further to access nutrient and moisture – hence the need in this type of system for huge volumes (typically -50 cubic meters (-1765.7 cu. ft.) per tree, provides approximately 12 cubic meters (423.8 cu. ft.) of actual soil for roots)

This type of planting method has been used in Scandinavia due to the abundance of low-cost stone. It has the advantage of being very free draining and can be poured around obstructions. However, topsoil is still required in and around the tree pit sufficient for the roots zone of rapid taper before it enters the rock soil matrix. Correct mixing, and close installation supervision by qualified personnel, are vital to their successful use of this product. Although it has a role in some urban tree planting situations, the high cubic volumes required tends to preclude the use of this system widely in the UK.

Compacted ground and soil conditions are the principal reason for the demise of urban trees, hence the necessity for a good quality uncompacted soil – within a system such as **RootSpace**, which cares for the actual physical soil structure.

At **GreenBlue Urban**, our recommendation will always be to provide tree roots with the substance nature intended – actual good quality uncompacted topsoil – trees have been successfully growing in this for thousands of years.



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RootSoil 20™

Standard Soil

Benefits

- Optimum tree health, stability and longevity
- Zero maintenance or fertilization required
- Naturally well-draining

Features

- Excellent friable texture
- Carefully controlled clay, silt and sand levels
- Well balanced organic content
- Meets stringent test standards

Specification

When installing tree pits in depths of more than 600mm use ROOTSOILSUBA in the lower section of the tree pit to eliminate the risk of soil becoming anaerobic.

Deliveries Available

- Bulk bag
- 20t rigid lorry
- 29t articulated lorry
- Grab lorry

Our recommendation will always be to provide tree roots with the substance nature intended - good quality, uncompacted topsoil. Trees have been growing in this for thousands of years.

RootSoil 20 is our premium blend of quality sandy loam topsoil providing the ultimate in tree health, growth and longevity. Proven by decades of urban tree planting.



Product codes and specifications

Code	Description	Unit	Density
ROOTSOIL20A	RootSoil 20 - Premium top soil for GBU soil cell profiles	Tonne	Approx 1.4-1.5t /m3
ROOTSOILSUBA	RootSoil SUB - Subsoil for GBU soil cell profiles	Tonne	



COOK & INDI'S
WORLD BUFFET

BAR WOOD



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ArborSoil Hydro

Standard Soil

Our recommendation will always be to provide tree roots with the substance nature intended – good quality uncompacted top soil. Trees have been successfully growing in this for thousands of years.

ArborSoil hydro is a special mix specifically blended as a result of research and testing for SuDS / LID tree pits. This soil type is designed to strike the optimum balance between high tolerance to repeated flooding, and highest nutrient retention.



Product codes and specifications

Code	Description	Unit	Density
ARBORSOILHYDROA	ArborSoil Hydro topsoil for GBU SuDS tree pits	Tonne	Approx 1.5-1.6t / m3
ARBORSOILSUBA	ArborSoil Hydro topsoil for GBU SuDS tree pits	Bulk bag	

Benefits

- Guarantees optimum tree health, growth and longevity
- Provides excellent stormwater attenuation capabilities
- Good water outflow quality

Features

- High tolerance to repeated flooding
- Excellent nutrient retention
- High levels of water pollutant removal

Specification

Designed to drain freely so that a tree pit can be used for water attenuation without affecting the health of the tree but retaining adequate nutrient levels. Install throughout the tree pit at all depths but use ARBORSOILSUBA directly beneath the rootball to avoid anaerobic conditions in that area.

Deliveries Available

- Bulk bag
- 20t rigid lorry
- 29t articulated lorry
- Grab lorry



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RootStart

Mycorrhizal Fungi

Benefits

- One treatment lasts a lifetime - as the plant grows the fungal partner grows
- Reduced mortality - for bare rooted, root balled and specimen plants
- Better drought tolerance - the vast fungal root system makes best use of all available soil moisture
- Earlier and better growth - in 2-4 weeks after planting, the mycorrhizal fungi can increase the active root area of plants by up to 700 times
- Better uptake of fertilisers - when applied after planting, the network of mycorrhizal fungi acts like a net catching nutrients and prevents leaching
- Increased uptake of trace elements - from the soil leading to increased plant health (the ultra-fine fungal mycelium can unlock nutrients from the soil)
- Easy to use - simply sprinkle into the planting pit as directed

RootStart is **GreenBlue Urban** mycorrhiza inoculant for use when planting trees in urban areas. Mycorrhiza occurs naturally in forest situations and is hugely beneficial to as root systems, increasing exponentially the ability of roots to absorb vital water and nutrients from the soil. Having studied the research related to this product, we are now offering this soil additive for all new urban tree planting schemes.

Whilst in a healthy forest floor situation mycorrhiza occurs naturally, with the majority of new urban tree planting projects we are using locally sourced 'manufactured' soils. Whilst these soils are made to exacting mineral specifications and contain green waste and organic matter, they are frequently biologically inert and deprived of natural mycorrhiza.

Hence we are suggesting that for a minimal investment, a small amount of **RootStart** mycorrhiza added to the backfill immediately surrounding the root ball, will increase the establishment rate of the root system.



Product codes and specifications

Description	Quantity	Number of trees
RSPMF10LA	10ltr	Approx. 50
RSPMF2.5LA	2.5ltr	Approx. 10



Canary Wharf Crossrail, London, UK



Wembley Stadium, London, UK

Tree Pit Irrigation

Overview

Drought stress causes more urban tree mortality than any other factor. It is not only required for all the biochemical requirements for growth photosynthesis, respiration and transport, but also mechanical support to leaf and stem tissue.

Insufficient (or inefficient) watering will result in loss of leaf turgor and consequent reduction in new shoot extension. Eventually, this will lead to die-back and, if not remedied, the loss of the tree.

Research has shown that trees irrigated 'proactively' i.e. by implementing a regular watering regime, have over three times the weight of new roots growing into backfill soil material compared to those watered 'reactively'. Waiting until the tree shows signs of drought stress before watering is known as 'reactive' irrigation. Whilst this might keep the tree alive, it will often result in stem die-back and possibly long-term structural defects in the tree.

Tree watering requirements

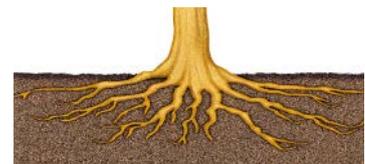
	Girth (cm)	Height (cm)	Estimated daily* transpiration rate (litres)	Suggested first season summer watering requirements (litres per month)
Feathered	6 (2.3")	1.8 - 3.0 (6 - 9.8")	1 (0.2 Gal)	36 (7.9 Gal)
Light Standard	6 - 8 (2.3 - 3.1")	2.4 - 2.7 (7.9 - 8.8")	1 (0.2 Gal)	36 (7.9 Gal)
Standard	8 - 10 (3.1 - 3.9")	2.7 - 3.0 (8.8 - 9.8")	1.2 (0.26 Gal)	45 (9.8 Gal)
Selected Standard	10 - 12 (3.9 - 4.7")	3.0 - 3.6 (9.8 - 11.8")	2.0 (0.4 Gal)	75 (16.4 Gal)
Heavy Standard	12 - 14 (4.7 - 5.5")	3.6 - 4.2 (11.8" - 13.7")	3.0 (0.6 Gal)	115 (25.2 Gal)
	14 - 16 (5.5 - 6.2")	4.2 - 4.8 (13.7 - 15.7")	4.0 (0.8 Gal)	150 (33 Gal)
Extra Heavy	16 - 18 (6.2 - 7")	4.8 - 5.4 (15.7 - 17.7")	5.0 (1 Gal)	190 (42 Gal)
	18 - 20 (7 - 7.9")	5.4 - 6.0 (17.7 - 19.6")	6.0 (1.3 Gal)	220 (48.4 Gal)
Semi Mature	20 (7.9") +	6.0 (19.6") +	7.0 (1.5 Gal) +	300 (66 Gal) +

*Calculations for transpiration and suggested watering requirement are based on a typical plane tree in a tree pit ameliorated with 25% peat and with a 50mm (1.97") mulch layer. The figures are approximate and are for guidance only. Allow an extra day for every 10mm (0.4") of rainfall.

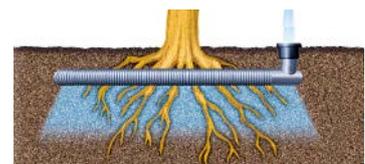
The Principles of Tree Root Watering



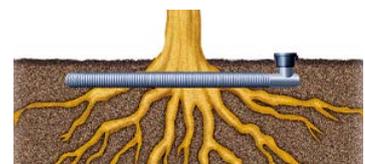
Surface irrigation is rarely efficient for trees, the topsoil layer waterlogs, leading to surface run off, soil capping, compaction and wastage. Water has difficulty penetrating the deeper root zone.



If surface is irrigated regularly to a shallow depth, roots will remain near the surface leading to a long-term susceptibility to drought.



RootRain waterers deliver water directly to the root zone. This eliminates wastage and reduces the risk of surface compaction.



The roots are encouraged to establish at a greater depth improving long term drought resistance and tree stability. Provides an access point for air and feeding with soluble fertilisers.

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RootRain Metro

Irrigation System

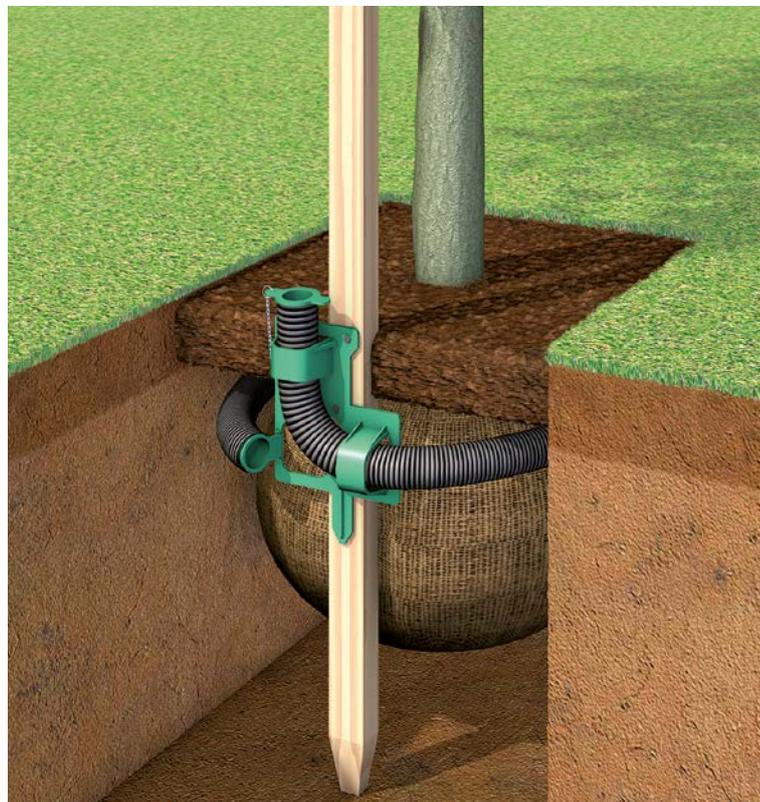


The original **RootRain Metro** system is the most widely specified proprietary tree pit irrigation system. Designed and manufactured in Britain, the Metro is available in three different sizes and with three different cap configurations.

The system is also available in contractor pack form for self assembly.

Benefits

- Quick and easy to install
- Extremely cost effective
- Improved drought tolerance
- Fast watering (60 litres (15.9 gallons) per minute in porous soil)
- Reduces water volume requirements by eliminating wastage
- 100% Recycled material



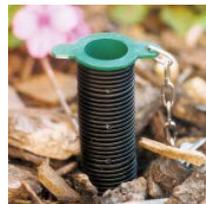
Typical Installation Specification

Install **RootRain Metro** (state product code) c/w pipe and fixing bracket with attached top cap as follows:

Loop the free end of the 35mm (1.8") perforated irrigation pipe around the root system approximately 250mm (9.8") below finished level. Plug the pipe into the bracket bottom cap.



RootRain with plastic cap.



Plastic cap with chain.



Metal cap with chain.



Simply loop around the shoulder of the root ball.



Nail the bracket to the tree stake before backfilling to conceal the Metro bracket.

Nail the bracket to the tree stake to prevent theft. Backfill the rest of the tree pit. It is important to ensure that the inlet pipe and top cap protrude between 10mm (0.4") and 50mm (1.97") from the finished surround level. The main bracket section should not be visible.



Effective



Discreet



Unobtrusive

Compatible 'ArborSystem' Products

- Root Management. Page 30

Product specification and codes

Code	Cap Type	Pipe Diameter	Length	Rootball Diameter
RR1A	Plastic	35mm (1.4")	1.25m (49.2")	0.4m (15.7")
RRPC1A	Plastic with chain	35mm (1.4")	1.25m (49.2")	0.4m (15.7")
RRMC1A	Metal with chain	35mm (1.4")	1.25m (49.2")	0.4m (15.7")
RR2A	Plastic	35mm (1.4")	1.75m (68.9")	0.55m (21.6")
RRPC2A	Plastic with chain	35mm (1.4")	1.75m (68.9")	0.55m (21.6")
RRMC2A	Metal with chain	35mm (1.4")	1.75m (68.9")	0.55m (21.6")
RR3A	Plastic	35mm (1.4")	2.5m (98.4")	0.8m (31.5")
RRPC3A	Plastic with chain	35mm (1.4")	2.5m (98.4")	0.8m (31.5")
RRMC3A	Metal with chain	35mm (1.4")	2.5m (98.4")	0.8m (31.5")

Standard Tree Pit Details

To clearly illustrate correct product application, please refer to our standard tree pit details which are in the tree product packages section.



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RootRain Urban

Irrigation and Aeration System



A large capacity irrigation system with a fixed non-removable grid inlet. The grid allows water and air through but prevents ingress of litter and debris.

The **RootRain Urban** is particularly suited to roadside verge and open space tree planting. The inlets are strimmer resistant and can be set below mowing machine height. They have very little vandal appeal and no theft value, making them ideal for housing estates and public areas.

Benefits

- Large capacity 80mm (3.14") inlet with 60mm (2.4") watering circuit
- Easy and quick installation
- Cost effective on the largest or smallest schemes
- Extremely vandal resistant
- Discreet and unobtrusive appearance
- Fast watering (100 litres (26.4 gallons) per minute in porous soil)

Typical Installation Specification

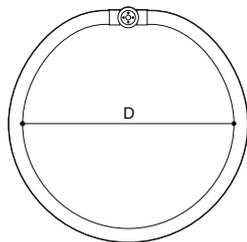
Install **RootRain Urban** (1, 2 or 3) irrigation system as follows:

Loop the 60mm (2.4") irrigation pipe around the shoulder of the root ball (200mm-300mm (7.9" - 11.8") below ground level) and connect securely to the tee piece. The vertical piece of pipe can be cut to length to ensure that the inlet is flush or slightly (25mm (1") maximum) proud of the final pit surround.

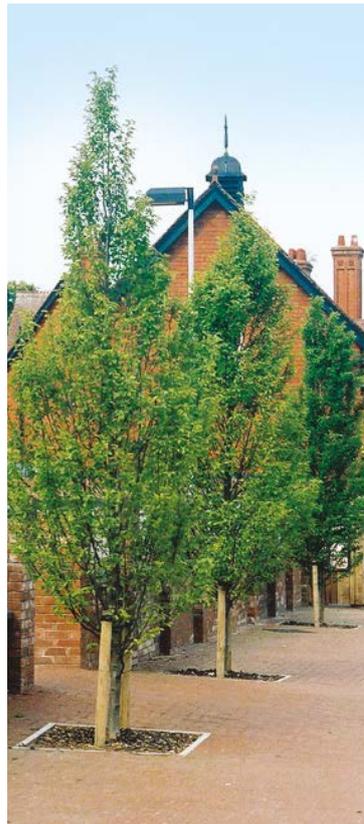




This illustrates the correct level for the **RootRain Urban** inlet. Too low could lead to blockages; too high can look obtrusive.



Using the table below the specifier can select the correct size in relation to root ball diameter.



RootRain Urban - the cost-effective high capacity tree waterer designed for durability.

Product Specification

- Inlet: 80mm (3.14") heavy duty HDPE moulded grid top
- Reducer: 80/60mm HDPE with integral strengthening find
- Vertical pipe: 60mm (2.4") PE perforated pipe
- Tee Section: Heavy duty HDPE with non return locking lugs to secure pipe work

Compatible 'ArborSystem' Products

- Root Management. Page 30
- Root ball guying. Page 70

Product specification and codes		
Code	Diameter D	Pipe Length
RRURB1A	895mm (35.2")	3m (9.8ft)
RRURB2A	1530mm (60.2")	5m (16.5ft)
RRURB3A	2490mm (98")	8m (26.2ft)

Standard Tree Pit Details

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RootRain Civic

Large Capacity Irrigation System



The **RootRain Civic** system is a very well proven large capacity irrigation system which has a vandal resistant inlet with a powder coated aluminium cap on a retainer chain. Popular with landscape architects and contractors, the **Civic** has been widely used on projects demanding a high level of specification.

Benefits

- Large capacity 80mm (3.14") inlet with 60mm (2.4") watering circuit
- Vented aluminium cap on retainer chain
- Prevents fines entering irrigation system
- Quick and easy to install

Typical Installation Specification

Install **RootRain Civic** (1, 2 or 3) irrigation system, complete with aluminium cap and retainer chain.

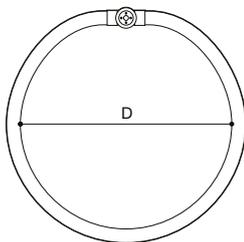
Loop the 60mm (2.4") irrigation pipe around the shoulder of the root ball (200mm-300mm (7.9" - 11.8") below ground level) and connect securely to the tee piece. The vertical piece of pipe can be cut to length to ensure that the inlet is flush or slightly (25mm (1") maximum) proud of the final pit surround.



When installed correctly, only the aluminium cap should be visible.



Typical locations for **RootRain Civic** installation.



Using the table below the specifier can select the correct size in relation to root ball diameter.



When installed correctly, only the aluminium cap should be visible.



Cap is ventilated to allow some air exchange to the tree pit. Ideal for use in bark mulch areas.

Product Specification

- Inlet: 80mm (3.14") heavy duty HDPE moulded grid top
- Reducer: 80/60mm HDPE with integral strengthening find
- Vertical pipe: 60mm (2.4") PE perforated pipe
- Tee Section: Heavy duty HDPE with non return locking lugs to secure pipe work

Compatible 'ArborSystem' Products

- Root Management. Page 30
- Root ball guying. Page 70

Product specification and codes

Code	Diameter D	Pipe Length
RRCVIC1A	895mm (35.2")	3m (9.8ft)
RRCVIC2A	1530mm (60.2")	5m (16.5ft)
RRCVIC3A	2490mm (98")	8m (26.2ft)



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RootRain Hydrogrille

For heavily trafficked areas



A large capacity irrigation system with a fixed non-removable grid inlet. The grid allows water and air through but prevents ingress of litter and debris.

The **RootRain Hydrogrille** is particularly suited to roadside verge and open space tree planting. The inlets are strimmer resistant and can be set below mowing machine height. They have very little vandal appeal and no theft value, making them ideal for housing estates and public areas.

Benefits

- Heavy cast LM6 grade aluminium inlet - withstands high loads
- Steel vent lid permanently attached to inlet by stainless steel fitting
- Lid lifts and swings to one side for fast irrigation
- Inlet twistlocks into **GreenBlue Urban's** range of tree grilles
- Can be used in conjunction with **ArboResin** porous bound gravel
- Flush finish ensures no trip hazard



The Hydrogrille is frequently used to provide several irrigation/aeration points around individual large trees in conjunction with the RootSpace system.

Typical Installation Specification

Install **RootRain Hydrogrille** (1, 2 or 3) irrigation system c/w cast aluminium inlet as follows: Loop the 60mm (2.4") irrigation pipe around the shoulder of the root ball (200mm-300mm (7.9" - 11.8") below ground level) and connect securely to the tee piece.



The vertical piece of pipe can be cut to length to ensure that the inlet is flush with the paving surround. If fitting into a tree grille, ensure inlet is connected to vertical 60mm (2.4") riser pipe, locate inlet into purpose formed aperture within the grille and twist to lock into place.

Product Specification

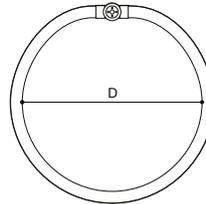
- Inlet: 120mm (4.7") diameter to suit tree grilles. Heavy cast aluminium/bronze inlet with lift and swivel vent lid.
- Vertical pipe: 60mm (2.4") PE perforated pipe
- Tee section: Heavy duty HDPE with non-return locking lugs to secure pipework
- Pipe circuit: 60mm (2.4") PE perforated pipe



Hydrogrille Inlet which interlocks with our 'ArborSystem' range of tree grilles.



Inlet opens for irrigation.



Using the tables below, the specifier can select the correct size in relation to root ball diameter.

Compatible 'ArborSystem' Products

- Root management. Page 30
- Soil structure systems. Page 42
- Underground root ball guying. Page 72
- Tree grilles and guards. Page 83
- Porous resin bound gravel. Page 98

Product specification and codes

Code	Diameter D	Pipe Length
RRHYDR1A	895mm (35.2")	3m (9.8ft)
RRHYDR2A	1530mm (60.2")	5m (16.5ft)
RRHYDR3A	2490mm (98")	8m (26.2ft)
RRHYDRD13A*	2490mm (98")	8m (26.2ft)

* Double Inlet

Standard Tree Pit Details

To clearly illustrate correct product application, please refer to our standard tree pit details which are in the tree product packages section.



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RootRain ArborVent 100/150

For heavily trafficked areas



The new **RootRain ArborVent 100 / 150** tree aeration system maintains long term soil health and fertility by facilitating high volumes of oxygen to reach the tree rooting area directly and allowing toxic gases to escape - a critical tree welfare factor.

The lift and swing lid has the added benefit of easy access for cleaning and has the capacity to withstand heavy vehicular overrun, including from street sweepers.

Benefits

- Heavy cast LM6 grade aluminium inlet - withstands high loads
- Aluminium vent lid permanently attached to inlet by stainless steel fitting
- Lid lifts and swings to one side for fast irrigation
- Can be used in conjunction with **ArboResin** porous bound gravel
- Flush finish ensures no trip hazard
- Specify **ArborVent 150** for all WSUDS tree pit installations requiring optimal aeration



The **ArborVent** is frequently used to provide several irrigation/aeration points around individual large trees in conjunction with the soil cell system.

Typical Installation Specification

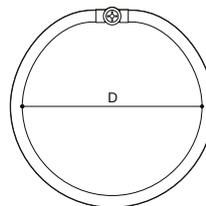
Install **RootRain ArborVent** (1, 2 or 3) irrigation system c/w cast aluminium inlet as follows: Loop the 60mm irrigation pipe around the shoulder of the root ball (200mm-300mm (7.9" - 11.8") below ground level) and connect securely to the tee piece.



RootRain ArborVent inlet set in paved surround.



ArborVent 150 Inlet.



Using the tables below, the specifier can select the correct size in relation to root ball diameter.

The vertical piece of pipe can be cut to length to ensure that the inlet is flush with the paving surround. If fitting into a tree grille, ensure inlet is connected to vertical 60mm (2.4") riser pipe, locate inlet into purpose formed aperture within the grille and twist to lock into place.

Product Specification

- Inlet: 120mm (4.7") diameter to suit tree grilles. Heavy cast aluminium inlet with lift and swivel vent lid. **ArborVent** 110mm x 110mm (4.3" x 4.3")
- Vertical pipe: 60mm (2.4") PE perforated pipe
- Tee section: Heavy duty HDPE with non-return locking lugs to secure pipework
- Pipe circuit: 60mm (2.4") PE perforated pipe

Compatible 'ArborSystem' Products

- Root management. Page 30
- Soil structure systems. Page 40
- Underground root ball guying. Page 70
- Tree grilles and guards. Page 81
- Porous resin bound gravel. Page 96

Standard Tree Pit Details

To clearly illustrate correct product application, please refer to our standard tree pit details which are in the tree product packages section.

Product specification and codes

Code	Product	Diameter D	Pipe Length
RRARBV1D	ArborVent 100	895mm (35.2")	3m (9.8ft)
RRARBV2D	ArborVent 100	1530mm (60.2")	5m (16.5ft)
RRARBV3D	ArborVent 100	2490mm (98")	8m (26.2ft)
RRARBVDI3D	ArborVent double inlet	2490mm (98")	8m (26.2ft)
RRARBV150A	ArborVent 150	-	750mm(29")



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ArborGuy

Securing large root balled trees



Benefits

- A guying system to fully complement **GreenBlue Urban** tree packages
- Designed for trees in the urban and rural environments
- An effective and out of sight method of guying trees in preference to staking
- Strapping will not cut the rootball, therefore no mats or timber required
- Ground anchors manufactured from advanced high strength composite

ArborGuy - Drive In systems

Extensive research has resulted in the launch of the **GreenBlue Urban** 'ArborGuy' tree guying system. The patented design, unique to **GreenBlue Urban** provides fast easy installation.

The **ArborGuy** anchor has been designed to be as streamlined as possible for driving into compacted sub soils, whilst combining superb 'groundlock' technology for secure tree anchoring - testing shows in excess of 1340kgs (2,954.2 pounds) of upward force on just one anchor driven into subsoil from ground level.

This method of securing trees has many advantages over staking and is suitable for large root-balled trees. The root ball is held in position by driving three anchors into the base of the tree pit and then fastening the **ArborGuy** ratchet strap as shown. If required, the system can be re-tensioned at a later date.



Strap to be threaded through rings, over rootball, into ratchet tensioner and tensioned as necessary.

Product specification and codes

Code	Description	Tree girth
SASMCB	ArborGuy strapped anchor system with medium sized heavy duty composite anchor heads	<20cm* (7.87")
SASLCB	ArborGuy strapped anchor system with large sized heavy duty composite anchor heads	<40cm* (15.74")
SASKITXMA	ArborGuy SASMCB installation kit - includes drive rod, drive rod rammer, setting tool, and drive rod pull out tool	
SASKITXLA	ArborGuy SASLCB installation kit - includes drive rod, drive rod rammer, setting tool, and drive rod pull out tool	

*For trees larger than 40cm girth, use two SASL kits per tree, six anchor wires positioned equally around the rootball, the two straps installed in a 'Star of David' pattern



ArborGuy anchor system, plus complete installation tool kits available

ArborGuy - Deadman systems

The well-known 'Deadman' variety of the **GreenBlue Urban ArborGuy** is a favourite with many customers. Ideal for use in tree pits where underground utilities may be present immediately beneath. Two or three 'Deadmen' (e.g. timber stakes) are placed in the bottom of the pit, and three **ArborGuy Deadman** wires are noosed round them providing very stable anchoring points for restraining the tree rootball.

To solve some common problems **GreenBlue Urban** have also designed the **AnchorPlate**. An immediate choice for contractors, the **AnchorPlate** is a complete package, removing the need for additional materials to be procured. The **AnchorPlate** is a very low-profile anchor designed to eliminate the need for further excavation during tree planting.

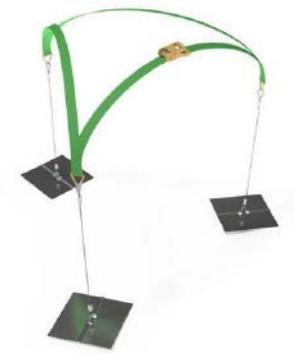
ArborGuy Deadman (no plate)

Code	Description	Wire length	Tree girth
SASDMB	ArborGuy Deadman strapped anchor system	1.0m (3.2 ft)	<40cm* (15.74")
SASDMXA	ArborGuy Deadman extra-long strapped anchor system	1.25m (4.1 ft)	<100cm* (39.37")

ArborGuy AnchorPlate

Code	RootSpace depth	Wire length	Tree girth
SASAP04A	400mm (15.74")	0.5m (1.6 ft)	<40cm* (15.74")
SASAP06A	600mm (23.62")	0.7m (2.3 ft)	<40cm* (15.74")
SASAP08A	800mm (31.49")	0.9m (3.0 ft)	<40cm* (15.74")
SASAP10A	1000mm (39.37")	1.1m (3.6 ft)	<40cm* (15.74")
SASAP12A	1200mm (47.24")	1.3m (4.3 ft)	<40cm* (15.74")

*For trees larger than 40cm girth, use two SAS kits per tree, six anchor wires positioned equally around the rootball, the two straps installed in a 'Star of David' pattern



Benefits

- Out of sight anchoring
- Strapping will not cut into the rootball
- Low profile anchor eliminates further excavation
- Complete package, nothing else required

Features

- Three high strength galvanised steel wires
- Single piece anchor strap for fast installation
- Fully compliments GBU packages



ArborGuy AnchorPlate kit.



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Product Finder

Above Ground

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Newcastle University, Newcastle, UK

Ties & Protection

Support and protection

GreenBlue Urban offers a comprehensive range of products for tying and protecting new tree planting.

If specifying plastic or rubber tree ties, ensure these are checked regularly during the maintenance period and removed as soon as the tree has established its own anchorage. Unremoved ties can eventually strangle the tree as its trunk expands.

An alternative for small trees is to specify our biodegradable tree tie. **NatureTie** made from hessian, which will break down naturally over time as the tree establishes its own anchorage. In exposed areas, it may be necessary to re-tie trees during the maintenance period.

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Tree Ties

Securing large root balled trees



Benefits

When selecting a method and the material for tree tying the following factors should be considered.

1. Size of tree.
2. Location.
3. Maintenance requirements.
4. Likely wind loading and other environmental considerations.
5. Durability and cost.
6. Vandalism.
7. Aesthetic appearance.

GreenBlue Urban stocks an extensive range of tree tie products to suit many varying applications.



GLPAA and GLPAAA

GLPBA



GLPFA and GLPFFA



Twin stake, belt and sleeve.



Belt and pad.



Twin stake belt and pad.

Pads, Blocks, Collars and Sleeves

Block code	Description	Belt size (mm)
GLPAA	Standard pad	25mm (1") belt
GLPAAA	Extra large pad	38mm (1.5") belt
GLPBA	Chunky pad	25mm (1") belt
GLPBBA	Chunky pad	38mm (1.5") belt
GLPFA	Plastic sleeve (300mm)	25mm (1") belt
GLPFFA	Plastic sleeve (300mm)	38mm (1.5") belt

Types of Belt

Code	Description	Length (m)	Width (mm)
GLB25B	Reinforced	10 (32.8 ft)	25 (1")
GLB35B	Reinforced	10 (32.8 ft)	35 (1.37")

Reinforced - Nylon reinforced rubber belt, most popular version for local authorities and landscapers

Weldmesh Tree Guards



Installed Greencoat **Weldmesh** tree guard.

Weldmesh Tree Guards

Made from 3" x 1" x 12" gauge pre-galv welded mesh. To be secured to stake using 3 galvanized staples.

These are available in both galvanised finish and greencoat. Greencoat weldmesh guards have a green plastic protective coating to protect them and enhance their appearance.



GreenBlue Urban 1.2m high Weldmesh guard.



GreenBlue Urban Greencoat guard.

Product specifications and codes

Code	Galvanised weldmesh tree guards 300mm dia
GLWVG12X3A	1200mm high
GLWVG18X3A	1800mm high

Code	Greencoat weldmesh tree guards 300mm dia
GLGCG12X3A	1200mm high
GLGCG18X3A	1800mm high

NOTE: Bespoke Weldmesh tree guards can be manufactured to order.

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NatureTie

Biodegradable tree tie material



NatureTie - a versatile and natural product suited to various tying applications

Benefits

- 100% natural material, environmentally friendly from sustainable sources
- Strong, versatile and fast to install
- Very cost effective for large tree planting/forestry schemes
- Will not strangle the tree
- Reduces maintenance costs

Product codes

Code	Product
GLNTA	NatureTie (30m rolls)

In general, **NatureTie** can be used similarly to other tie materials, but without the need of a spacer between the tree and the stake. The spacer can be formed by the material itself.

This product has many advantages over plastic and rubber. It will not strangle the tree as the tree grows but will biodegrade gradually as the tree establishes its own roots for anchorage.



Tree Guard 4-Point Tie Kit

Protecting newly planted trees

The **GreenBlue Urban Tree Guard Tie** is designed as a premium adjustable restraint system which blends in very neatly with the Tree Guard and surroundings.

This prevents trees from sustaining damage in high winds against the side of the **Tree Guard**, and can be used to encourage a slightly misaligned tree towards a more upright growth pattern which is often very important in the urban realm. This is supplied as standard with most **GreenBlue Urban** vertical tree guards.



Benefits

- Prevents damage to the tree
- Encourages upright growth pattern
- Adjustable
- Fits a variety of tree guard sizes

Product codes

Code	Product
GLGTAB	Tree Guard Tie



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Tree Grilles and Guards

Above ground protection

Attractive and functional, grilles and guards have an important role to play in maintaining healthy tree pit conditions. **GreenBlue Urban's** range, offer value for money and the quality you would expect from the country's leading specialist supplier of urban tree planting products.



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Tree Grilles

Fully integrated tree surrounds

Benefits

- Enables the tree to receive natural water
- Prevents surrounding soil from being compacted
- Adds architectural flair to paved surfaces
- Available in many different finishes including powder coating to any RAL colour
- The grille frames can be disassembled once installed. This gives the contractor the option of planting the tree before or after installation

During the last two decades, **GreenBlue Urban** has been developing innovative products to assist trees below ground in their battle to establish and grow in hostile urban environments. Now with the **ArborSystem** tree grille range, that same attention to detail has been turned to tree pit surround systems.

ArborSystem tree surrounds are engineered to an extremely high standard under rigorous quality controls. **GreenBlue Urban** is an ISO 9002 company and takes product development and quality seriously. Consequently, the range detailed in this design guide represents the latest technology in tree surrounds. Illustrated are just some of the design features integral to the **ArborSystem** brand that have lifted our range to new levels of excellence.



Avon tree grilles installed at Bristol, Hengrove Park. More info on page 84.



Castle Tree Grille installed at a project in Ashington, Northumberland. See more on page 87.

The range of tree surrounds available from **GreenBlue Urban** cover the full spectrum of materials, finishes and styles.

Ductile Iron and Fabricated Steel surrounds are available from stock in many different sizes.

Polyester powder coating is a high quality and extremely durable finish which all our Ductile Iron tree grilles come in as standard. Steel surrounds are galvanised to BS EN ISO 1461 as standard. Different finishes are available on request.

See the following pages on our **Bespoke Design Service** where your ideas can become a reality, and we can guide how to interpret this into a practical functioning product that performs for years to come.



Zeta tree grille installed below ground and paved over at The Angel Building, London.

DTS Grille Systems

The standard **ArborSystem** tree grille range shown here is designed to integrate with a variety of different settings. Choice of design will be influenced by the following aspects:

- Existing site parameters and design elements
- Access requirements
- Anticipated vehicle traffic
- Disabled access
- Designer's personal judgement on aesthetics

ArborSystem grilles integrate with below ground root management, irrigation, aeration and guying systems. It is important that the below ground aspect of tree pit design is given careful consideration at the design stage. Tree literate design will pay dividends for years to come in the form of healthy, attractive trees.



Precast **ArboResin** tree grille installed in Ashford Retail Park. See more on page 96.



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Ductile Iron Tree Grilles

Ductile iron tree grille surrounds

GreenBlue Urban's cast iron tree surrounds are made of a type of iron called 'ductile iron' which exhibits high strength, flexibility, durability and elasticity compared to other types of cast iron, which is excellent for this application.

Fitting effortlessly into virtually any streetscape, our range of quality, timeless styles continue to be favourites with our customers, and come powder coated in a highly durable double coat polyester powder finish for longevity and ease of maintenance.

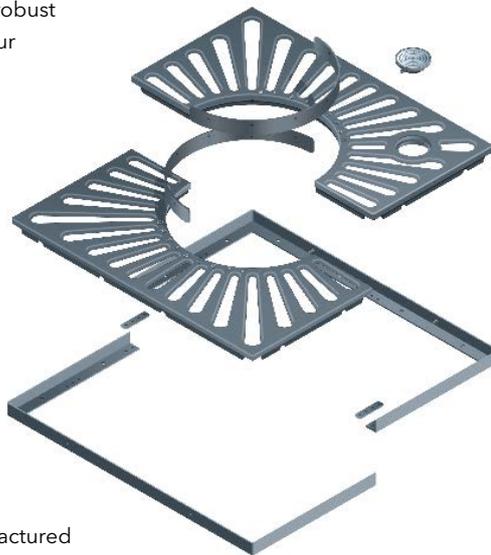
These are highly engineered, premium quality products, manufactured with rigid quality controls, and stand head and shoulders above many contemporary products.

Design

Our product development team has worked hard to ensure that even the most standard designs work well, look smart and give a trouble free life. Research and trials have helped us to arrive at the most effective and robust coatings where applicable for our product range.

Inner ring design

Allows for a neat and professional central opening. This gives additional tensile strength as well as providing fixing points for the vertical steel guard system.



Irrigation inlet fitting

ArborSystem RootRain Hydrogrille irrigation inlet fitting - another example of products engineered for purpose - heavy duty cast LM6 material giving a permanent access point for water and air, so vital for the tree. Plus, retaining bracket to ensure simple installation and alignment of irrigation pipe.

Integral features

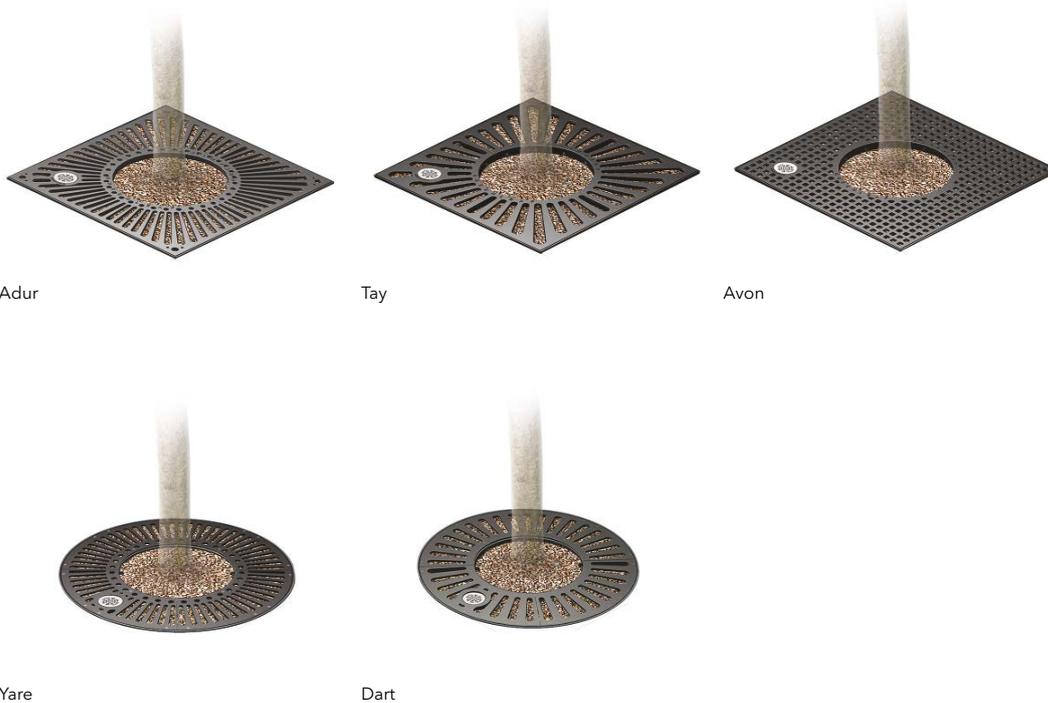
These high quality cast ductile grilles can incorporate integral apertures for irrigation aeration inlets and uplighters. Twist lock aperture secures the fittings to avoid theft or sub surface settlement differentiation.

Built for strength

These tree surrounds are manufactured to withstand the everyday traffic and loadings expected of urban hardscapes. Our product advisors can work with you to ensure that the grille you select is suited to the types of traffic you are expecting to use the area. The DTS grille range is designed to withstand any reasonable traffic overrun.

Support frames

ArborSystem support frames have involved many hours of development to produce a design that is easy to install, vandal resistant, cost effective to manufacture and unobtrusive in use. These frames are engineered to the highest standards and can be rated to handle different loading requirements.



Adur

Tay

Avon

Yare

Dart

Standard Tree Grille Range Availability			
Size square	1000mm (39.4")	1200mm (47.2")	1500mm (59.1")
Adur	ADUR10A	ADUR12A	ADUR15A
Avon	AVON10B	AVON12B	AVON15A
Tay	TAY10B	TAY12B	TAY15B
Size diameter	1000mm (39.4")	1200mm (47.2")	
Yare	YARE10A	YARE12A	
Dart	DART10A	DART12A	
Internal aperture diameter	500mm (19.7")	600mm (23.6")	600mm (23.6")

NOTE: Lead time subject to availability at time of enquiry.

*Sold in the UK only.

Typical Installation Specification

Ensure the depth around edge of tree grille frame has a minimum of 100mm (3.9") of concrete. Reinforce if loading requires it. Place outer frame on concrete ensuring that top is level and at a height to suit adjacent surfacing. When concrete foundation has set sufficiently, fit tree grille segments and fasten anti-vandal bolts. **RootRain Hydrogrille** inlet and vertical steel guard can now be fitted.



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Zeta Tree Grille

Concealed steel tree surround



Benefits

- Low profile paving support grille
- High strength design to support vehicle overrun
- Provision for **ArborVent** root plate ventilation
- Unique adjustable central opening location to allow precision adjustment

Product Specification

- Tree grille surface finished in Mild Steel Galvanised BS EN ISO 1461

The **Zeta** is a new, unique tree grille boasting a completely invisible structure allowing interruption-free paving right up to the tree. The low-profile design provides high strength support for virtually any type of paving adopted for the surrounding street scene.

This is even suitable for areas supporting certain types of vehicle access. The adjustable collar simplifies installation by absorbing variances in the tree pit build up in any direction, and allowing perfect finish levels and orientation.

The **Zeta** comes supplied with the full tree pit irrigation/aeration system as standard. This has been used with excellent results in the most demanding, very low tolerance locations.



The **Zeta** tree grille installed on a project outside the Angel Building, London.

Product specification and codes

Code	Size	Opening
GBUZETA10A	1000 x 1000mm (39.4" x 39.4")	600mm (23.6")
GBUZETA12A	1200 x 1200mm (47.2" x 47.2")	600mm (23.6")
GBUZETA15A	1500 x 1500mm (59.1" x 59.1")	600mm (23.6")
GBUZETA18A	1800 x 1800mm (70.8" x 70.8")	600mm (23.6")
GBUZETA20A	2000 x 2000mm (78.7" x 78.7")	600mm (23.6")

Castle Tree Grille

Recessed tray tree surround

The Castle tree grille is a heavy duty recessed tray system allowing virtually any style of surround paving to be placed within the trays and continue right over the tree pit whilst providing structural support for overrun as required.

Supplied complete with irrigation and aeration functionality.



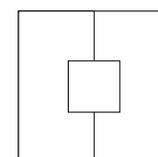
Benefits

- Irrigation and aeration systems built in as standard
- Can be manufactured to meet virtually any structural requirements
- Very discreet appearance once installed due to being infilled with paving
- Manufactured to meet required wheel loadings

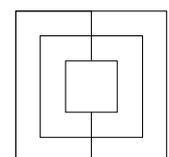
Product Specification

- Available in 7 different sizes
- Removable 'Double tray' format available in most sizes allows for tree growth
- Vertical guard attachment option available
- Heavy duty steel structure galvanised to BSEN ISO 1461

Product specification and codes		
Code	Size	Tray
CASTLE12A	1200 x 1200mm (39.4" x 39.4")	Single
CASTLE12B	1200 x 1200mm (47.2" x 47.2")	Double
CASTLE15A	1500 x 1500mm (59.1" x 59.1")	Single
CASTLE15B	1500 x 1500mm (59.1" x 59.1")	Double
CASTLE18A	1800 x 1800mm (70.8" x 70.8")	Double
CASTLE20A	2000 x 2000mm (78.7" x 78.7")	Double
CASTLE24A	2400 x 2400mm (94.5" x 94.5")	Double



Single Tray



Double Tray



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Precast Tree Grille

Precast permeable tree surround (available in the UK)



Benefits

- Simple and clean installation
- Can be installed in cold and damp conditions
- Strong construction to support tree guard
- Resists light vehicle overrun
- Grille is part of our DTS fully integrated system

Product Specification

- Tree grille surfaces finished in resin bound stone
- Supporting frame finished in galvanised mild steel

Standard Colour Range

GreenBlue Urban's Precast ArboResin can be supplied in any of the following standard aggregate colours.



Brittany Bronze



Dorset Gold



Silver Grey



Red Granite

Precast ArboResin

Precast ArboResin consists of precast resin bound segments which are manufactured off site in a quality controlled environment. This does away with any on site mixing as the segments are already cast and simply locate into our standard 1200mm (47.2") square DTS tree grille frame.

Cast within each segment is a specially designed preformed matrix of steel reinforcing rods. These add significant strength to the segments as well as providing a fixing point for the inner ring. A **GreenBlue Urban** vertical steel tree guard can then be bolted to the inner ring.

Also cast into one half of the precast segments is a **GreenBlue Urban ArborVent** irrigation inlet. This durable cast aluminium inlet is simply connected to the 60mm (2.4") diameter perforated pipe system surrounding the root ball.

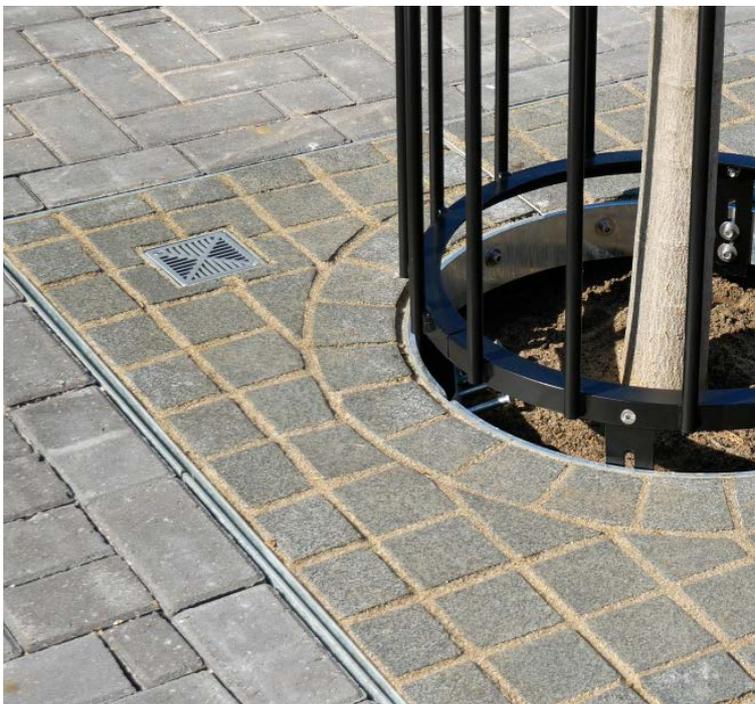


Precast **ArboResin** tree grilles installed at a project in Sandwich Quays.

SettStone Precast

A brand-new development by **GreenBlue Urban** provides an excellent new paved finish to the popular 1.2m (3.94ft) square precast tree grille.

Permeable materials mean the SuDS/LID compliant grille remains highly porous. This is a high strength grille which is simple to assemble.



The **SettStone** tree grille installed at Northpoint, Compass Park.



Benefits

- Permeable materials
- High strength design
- Unique GBU grille design
- SuDS/LID compliant
- Can be used in trafficked areas
- Simple assembly
- Theft proof

Product Specification

- Tree grille surface finished in natural stone
- Supporting frame finished in galvanised mild steel

Product specification and codes

Code	Size	Depth	Product	Colour
SSPC12UGA	1.2 x 1.2m (3.94ft)	50mm (1.96")	SettStone	Urban Grey
ARBPC12A	1.2 x 1.2m (3.94ft)	50mm (1.96")	ArboResin	Britany Bronze
ARBPC15A	1.5 x 1.5m (4.9ft)	60mm (2.36")	ArboResin	Britany Bronze
ARBPC12B	1.2 x 1.2m (3.94ft)	50mm (1.96")	ArboResin	Silver Grey
ARBPC15B	1.5 x 1.5m (4.9ft)	60mm (2.36")	ArboResin	Silver Grey



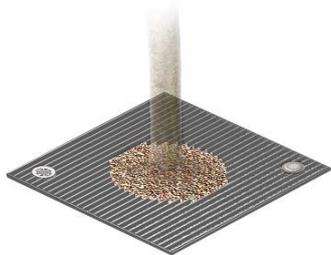
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Clyde Tree Grille

Fully integrated grille systems



Well designed grilles enable the tree to receive natural water, prevent surrounding soil from being compacted and add architectural flair to the paved surface.

Designs vary to function under different circumstances. Grille patterns with smaller gaps are chosen where minimum change to the surface is needed. They will retain planting material but allow the free passage of pushchairs, wheelchairs and supermarket trolleys.

Available in a wide range of different sizes, tree grilles can be specified as part of the **ArborSystem** package, incorporating vertical guard, root management, irrigation and uplighter integration.



'Clyde' grille, in central London, manufactured from grade 316 stainless steel.



Standard Tree Grille Range Availability

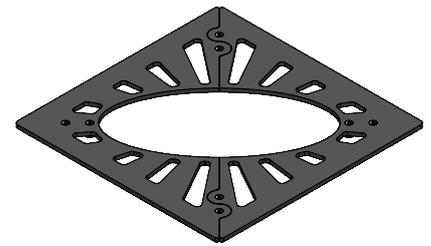
Size Square	1000mm (39.4")	1200mm (47.2")	1500mm (59")
Clyde (Galvanised)	CLYDE10GB	CLYDE12GB	CLYDE15GA
Clyde (Black powder coated)	CLYDE10BB	CLYDE12BB	CLYDE15BA
Internal aperture diameter	500mm (19.7")	600mm (23.6")	600mm (23.6")

Medway & Mersey Tree Grille

Laser cut steel tree surround

An excellent option for small street trees with a limited budget, especially retrofits and maintenance contracts. A comprehensive package, the **Medway** and **Mersey** grilles including a root director and a complete Metro irrigation system - **GreenBlue Urban** products which continue to stand the test of time.

A load bearing frame and vertical guard are further options available. Perfect for contractors requiring a fast and simple install, the **Mersey** and **Medway** grilles are just the right size to replace a single paving slab.



Benefits

- Low cost design - cost effective for limited budgets
- Comprehensive package - simplifies ordering
- Same size as paving slab - easy retrofitting
- Further options available - adaptable to unique requirements

Product Specification

- Tree grille surface finished in Mild Steel Galvanised BS EN ISO 1461

Product specification and codes

Code	Product	Dimensions	Material	Colour	Weight
MEDW06A	Medway LTS Tree Grille (elliptical centre)*	600mm x 10mm (23.6" x 0.4")	Mild steel	RAL9005 Matt Black	19.6kg (43.2 lbs)
MERS06A	Mersey LTS Tree Grille (round centre)*	600mm x 10mm (23.6" x 0.4")	Mild steel	RAL9005 Matt Black	20.4kg (45 lbs)
LTS600FRA	Load bearing frame for LTS 600mm tree grilles	600mm square (23.6")	Mild steel	Natural - galvanised finish	13.3kg (29.3 lbs)
GLWVG12X3A	Galvanised Weldmesh tree guard*	1200 x 300mm (47.24" x 11.8")	Mild steel	Natural - galvanised finish	2.2kg (4.9 lbs)
MEWMFIXA	Mersey Weldmesh Fixing kit*	-	Mild steel	RAL9005 Matt Black	1kg (2.2 lbs)
MERSPK06A	Mersey, frame, weldmesh guard package	-	-	-	-



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Vertical Tree Guards

Robust trunk protection

Benefits

- Protection against vandalism and accidental damage
- Designed to fit within **GreenBlue Urban** tree grille range
- Adds to quality design
- Standard tree grilles work with GLGTAB Tree Tie (Page 79)

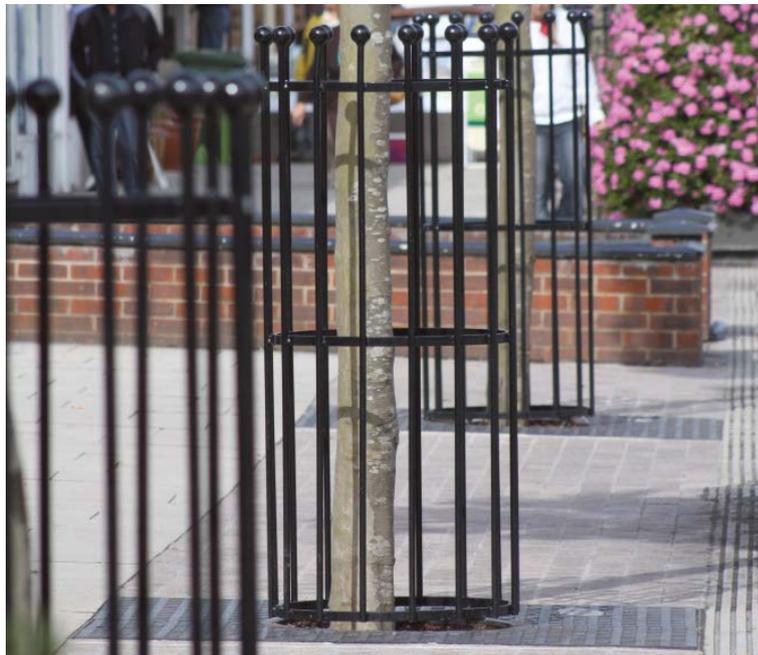
In an urban setting, young trees in particular are vulnerable to damage from bicycles and other equipment, as well as gratuitous vandalism. Tree guards offered by **GreenBlue Urban** are of strong construction and varying design and provide the ideal answer to such problems.

Tree guards can equally make a high quality visual design statement on public realm landscape schemes. The guards shown may be fitted to medium or heavy duty frames or ground fixed when used in parkland. The simple adjusting mechanism allows guards to be easily set on most gradients.

Each guard type is manufactured in a number of standard sizes to fit all grilles. Phone our sales line for prices and availability.



Bespoke tree guard design.



Ullswater tree guard.



Ullswater



Coniston



Derwent



Ennerdale



Thirlmere



Windermere

Product codes and specifications

Code	Style	Height	Diameter
CONIS5A	Coniston	1800mm (70.9")	500mm (19.7")
CONIS6A	Coniston	1800mm (70.9")	600mm (23.6")
DERW5A	Derwent	1800mm (70.9")	500mm (19.7")
DERW6A	Derwent	1800mm (70.9")	600mm (23.6")
ENNER5A	Ennerdale	1800mm (70.9")	500mm (19.7")
ENNER6A	Ennerdale	1800mm (70.9")	600mm (23.6")
THIRL05A	Thirlmere	1800mm (70.9")	500mm (19.7")
THIRL06A	Thirlmere	1800mm (70.9")	600mm (23.6")
ULLSSP5A	Ullswater	1800mm (70.9")	500mm (19.7")
ULLSSP6A	Ullswater	1800mm (70.9")	600mm (23.6")

Standard Tree Pit Details

To clearly illustrate correct product application, please refer to our standard tree pit details which are in the tree product packages section.



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Bespoke Tree Surrounds

Bespoke consultancy design and manufacture service



Our product design team will be pleased to work with clients to create a working tree grille design from their visual ideas. Contact our sales office for details.

Well-designed tree surrounds while possessing beautiful aesthetics to match their surroundings, also perform vital functions for the tree. They will allow natural water to access the rootball, they'll prevent the primary tree pit soil from becoming compacted, they'll protect the tree from physical damage, they may need to carry heavy traffic; they'll also be easy to maintain.

Case Studies

- Selfridges, Duke Street. Custom brass tree grilles. (Page 188)
- St Peter's Square, Manchester. Custom marine grade 316 stainless steel tree grilles. (Page 208)

With experience managing the most prestigious projects and meeting very demanding specifications, **GreenBlue Urban's** full range of manufacturing capabilities enable us to provide the solution to your project in a highly professional manner.



Bespoke **Precast ArboResin** tree grille.



Custom marine grade 316 stainless steel tree grille. St Peter's Square, Manchester.

Consultancy



Meet with or call one of our design team to discuss your vision and the technical requirements of your project.

Manufacturing



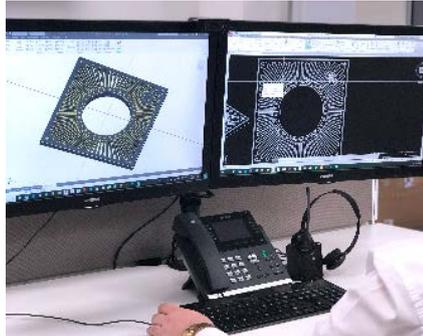
A full spectrum of manufacturing facilities and process are available to deliver pretty much anything.

On-site support



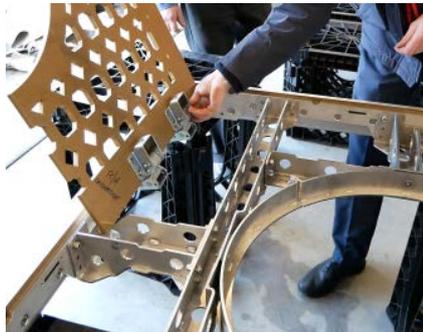
Certain projects are eligible to receive on-site support from GBU technicians to guide and support the efficient and correct installation of all products.

Design



Our engineers and designers will be able to bring your vision to life and will work with you to ensure all requirements are met in a cost-effective way.

Quality Control



Stringent quality control processes are conducted in accordance with ISO 9001 standards.

For more information, visit greenblue.com, or get in touch:

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ArboResin

Porous tree pit surface

Benefits

- Surface allows free flow of air and water to the root zone
- Will support light vehicular traffic (when laid to a minimum depth of 75mm (3"))
- Avoids problems associated with loose gravel
- A choice of different aggregates available
- Can be retrofitted around existing trees reducing trip hazards
- Detailed installation specification available on request



Compatible 'ArborSystem' Products

- Root management. Page 30
- Tree pit irrigation. Page 81
- Underground root ball guying. Page 70

ArboResin is a well proven hard wearing, attractive porous tree pit surface. Loose stones are a nuisance in pedestrian environments and tarmacadam or conventional paving has the effect of an impervious cap over the tree pit.

With **ArboResin**, the stone is bound together using a very high strength resin which prevents the gravel migrating beyond the tree pit. The nature of the resin bond results in a highly porous tree friendly surface immediately adjacent to the tree.



Standard Colour Range

GreenBlue Urban's Precast ArboResin can be supplied in any of the following standard aggregate colours.



Brittany Bronze



Dorset Gold



Silver Grey



Red Granite

Product codes and specifications

Code	Description	Resin type
GLARBBB	Brittany Bronze	Standard 2-part
GLARBUVSG	Silver Grey	UV Stable 3-part
GLARBUVRG	Red Granite	UV Stable 3-part
GLARBDG	Dorset Gold	Standard 3-part
ARBMIXA	ArboResin installation kit for mixing, laying and clean up	

Product Specification

- Triple washed and dried stone graded to 10mm (0.4"), supplied in 25kg (55.11 lbs) bags
- ArboResin two-part resin system. (Colour UV stabilized resin available as an option)
- ArboResin installation kit
- ArboResin solvent cleaner. Standard galvanised frames are available to provide a paving/ bound gravel edge and help support paving loading for light traffic

Standard Tree Pit Details

To clearly illustrate correct product application, please refer to our standard tree pit details which are in the tree product packages section.



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Tree Grates & Guards

Additional tree surround designs available in US and Canada

Available Finishes

- Galvanized
- Powder Coated
- Corten
- Stainless Steel

Tree Grate Dimensions

- 1m x 1m (3ft x 3ft)
- 1.2m x 1.2m (4ft x 4ft)
- 1.5m x 1.5m (5ft x 5ft)
- 1.8m x 1.8m (6ft x 6ft)

*Other custom sizes available

Typical Installation Specification

Grilles: Ensure the depth around edge of tree grate frame has a minimum of 100mm (4") of concrete. Reinforce if loading requires it. Place outer frame on concrete ensuring that top is level and at a height to suit adjacent surfacing. When concrete foundation has set sufficiently, fit tree grate segments and fasten anti-vandal bolts. RootRain HydroGrille inlet and vertical guard can now be fitted.

Grates: To ensure correct installation, please refer to our standard tree pit details which clearly illustrate correct product application.

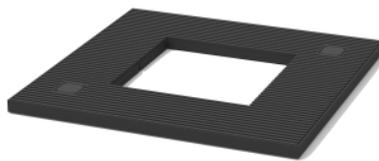
Tree Grates



Thames Tree Grate



Monza Tree Grate



Clyde Tree Grate



Wyandotte Tree Grate

Tree Guards



Thames Tree Guard



Monza Tree Guard



Clyde Tree Guard



Wyandotte Tree Guard

Street Furnishings

Furnishings that coordinate with tree grate and guard designs available in the US and Canada



Thames Collection



Monza Collection



Clyde Collection



Wyandotte Tree Grille

Street Furniture

- Benches
- Trash Cans
- Bike Racks
- Bollards
- Tree Pit Fences

Available Finishes

- Galvanized
- Powder Coated
- Corten
- Stainless Steel

Product Specifications

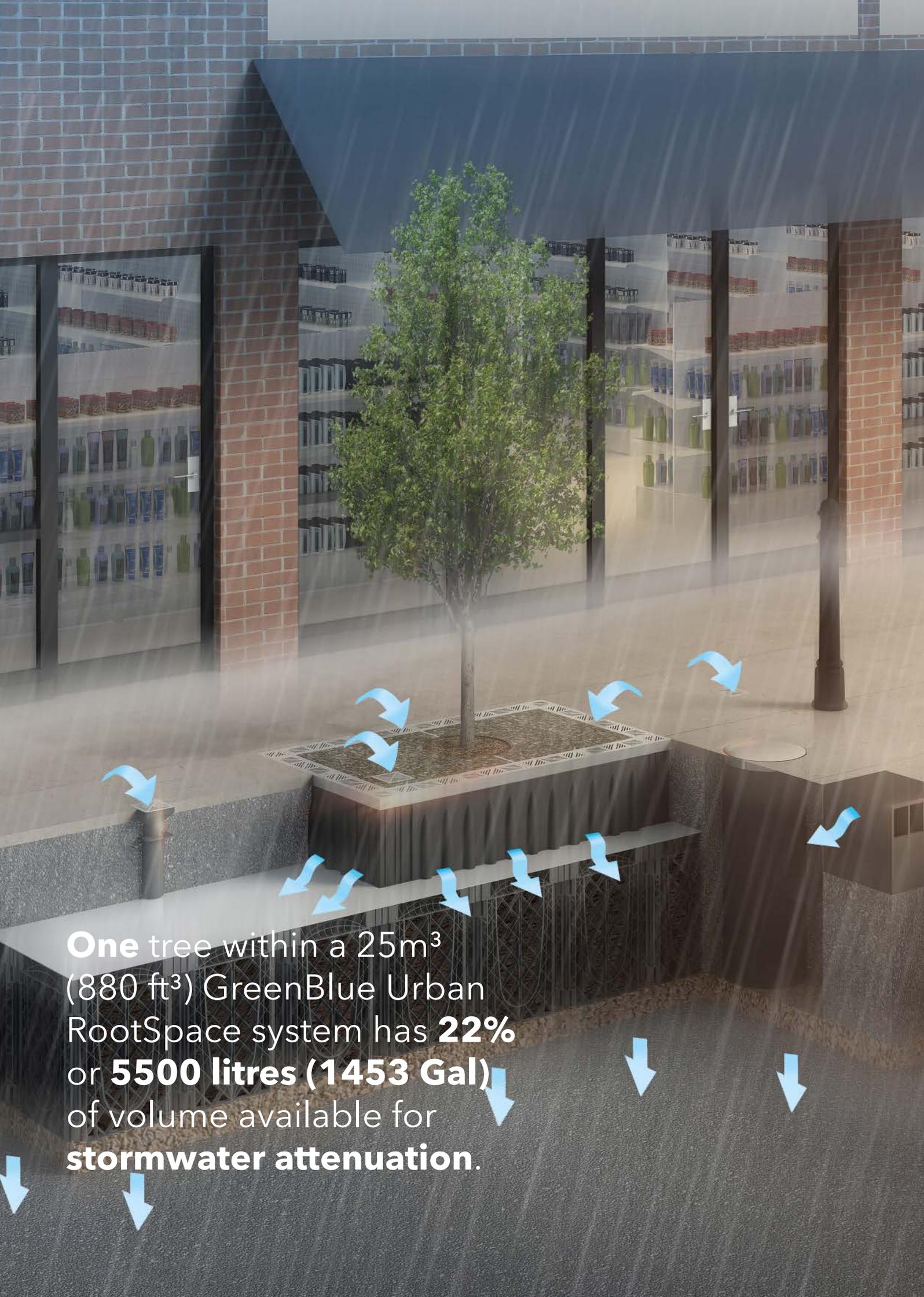
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One tree within a 25m³
(880 ft³) GreenBlue Urban
RootSpace system has **22%**
or **5500 litres (1453 Gal)**
of volume available for
stormwater attenuation.

SuDS / WSUD / LID

Stormwater Management

■ The History of Urban Drainage	100
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The History of Urban Drainage

For the past couple of thousand years, stormwater in our cities has been managed on the principle of containing the run off and channelling it away as fast as possible. The historical use of existing water courses to take the levels of run off may have worked to some extent during the pre-urban age, where the majority of people lived on the land, but with the urbanisation that began with the Industrial Revolution, these methods of water management became insufficient.



The other major influence on our stormwater management has been the massive increase in hard surfacing, both on the ground and on roofs. Impermeable paving, and sealed roofing products means that rain, once fallen, arrives at drainage systems far quicker than when surfacing was a permeable grit, and thatched roofing.

In the majority of the cities around the world, stormwater and sewage used the same channels for removal, which have evolved to become what is known as combined sewer systems. With the increase in population in the urban areas, the proportion of foul sewage to rain water has increased, meaning that many of our combined sewers are not able to cope with a storm water event, leading to flooding, and sewage incidents, which are health threatening.

More modern cities use a dual drainage system, with a foul sewer and a surface water sewer. The surface water sewer often exits into a water course nearby, as it officially only contains rainwater and run off from hard surfaces. Unfortunately, this hard surface run off often has traces of hydrocarbons and heavy metals which are not acceptable in water courses, and during severe rain storms, water courses can become polluted, causing death of fish and river life.

The concept of a more naturally managed storm water management policy started in the US and Australia in the 1970s, and then during the 1990s in the UK. These concepts called LID (Low Impact Development [USA]), WSUD (Water Sensitive Urban Design [AUS]) and SUDS (Sustainable Urban Drainage Systems [UK]) challenged existing policies by suggesting that rainwater should be slowed down as much as possible: and the time taken to enter the drainage system should be extended. This can be done by a number of means, but principally by maximising infiltration into the ground, storing storm water on site to be released slowly and by using vegetation to attenuate and clean the water.



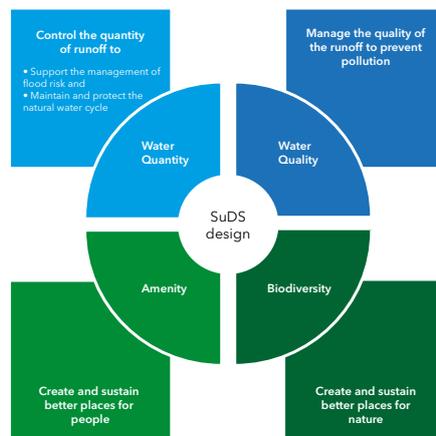
Sheffield Grey to Green inner city greenway providing protection to pedestrians from vehicles. © Nigel Dunnett

More recently stormwater has been recognised as an asset in our urban areas, rather than a liability which must be removed as fast as possible. Open stormwater gullies, known as swales, provide an area where water can be stored above ground for a period and drained slowly, and provides a visual and practical landscape amenity. In some cities, local authorities have made features of water management infrastructure, and these have enhanced urban life.

The Four Pillars of SuDS/LID

Quality, quantity, amenity, biodiversity

In 2015, CIRIA (Construction Industry Research and Information Association) launched the SuDS Manual, which stated that the overarching principle of SuDS design should be that surface water runoff should be used for maximum benefit, and the diagram below shows how the benefits can be delivered:



Many systems include one of these four pillars, but few actually meet all of these criteria. Many of the storage schemes manage the water quantity element (which of course is the most pressing in terms of flood management) but do not actually meet the other opportunities. Below ground storage, such as tanks or increased pipework sizes with flow controls provide nothing in amenity value and many local water authorities are no longer approving such schemes because of the challenges of maintenance. Some of the above ground features such as attenuation basins or swales do provide useful amenity and biodiversity opportunities but can be expensive in land use.

GreenBlue Urban has been concentrating our research and development department on SuDS / LID in recent years. It is clear that to maximise our land use is very important, and to provide attractive and safe places to live is also vital. In our experience, many developments are challenging places to install green infrastructure, as development density is ever increasing due to the rising cost of land and have limited options when considering water sensitive urban design.



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ArborFlow

Trees and sustainable urban drainage systems (SuDS / LID)

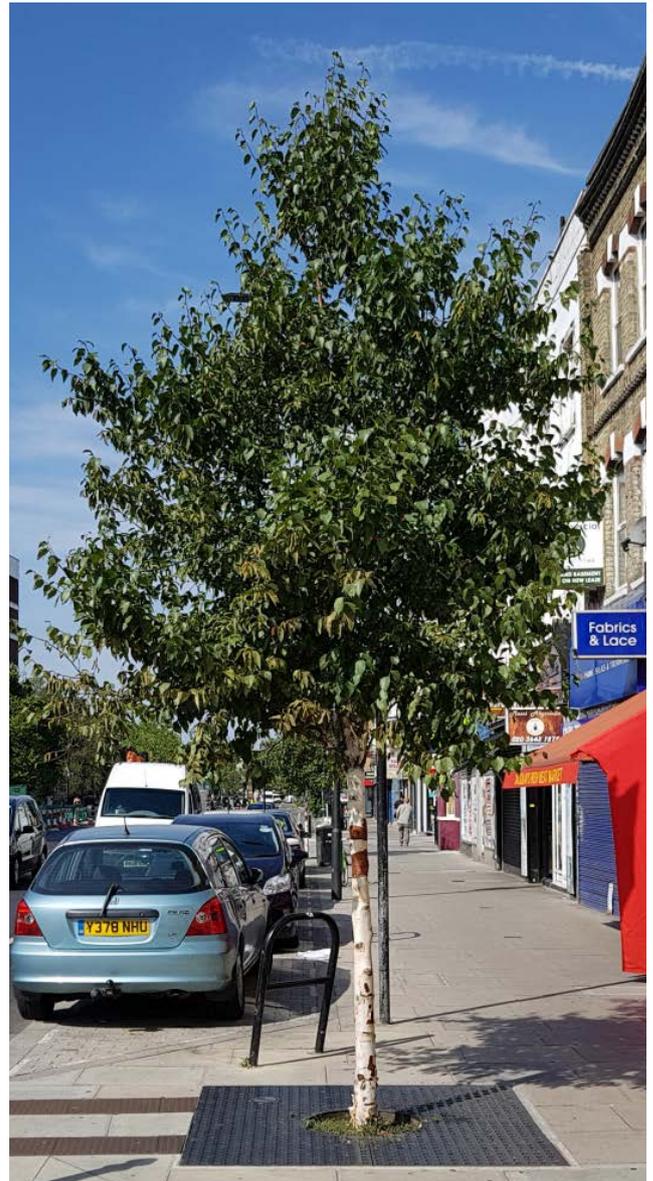
New developments in built-up conurbations and the unstoppable urbanisation of areas have exacerbated the potentially damaging effects of conventional surface-water drainage.

Traditional drainage of surface water run-off has been designed to convey rainwater, as rapidly as possible, from where it has fallen, to either a soakaway or a watercourse. This old method increases the risks of flooding, environmental damage and urban diffuse pollution, as run-off water usually carries contaminants including oils, heavy metals, pesticides, fertilisers, chemicals and other organic matter.

The implementation of sustainable drainage systems – demonstrated in outline as well as detailed applications and design submissions – is now demanded by authorities as a prerequisite of planning considerations, from early site evaluations, design and environmental-impact assessments.

Trees are playing an increasingly important role with SuDS / LID designs

- Trees slow water run-off. For every 5% of tree cover added to a community, stormwater run-off is reduced by approximately 2%.
- Tree root systems remove nutrients which are harmful to water ecology and quality.
- Trees act as natural pollution filters. Their canopies, trunks, roots and associated soil, filter polluted particulate matter out of the flow towards the storm sewers.



Completed SuDS / LID project. Goldhawk Road, London.

ArborFlow - How it works

GreenBlue Urban's urban-drainage storm water management system - **ArborFlow** - has been developed as a more sustainable, efficient and environmentally robust process of managing surface water run-off. It incorporates all the four pillars of SuDS / LID in a modular adaptable form that can be installed in the most restricted of situations. Designed for use in urban areas where space is at a premium, **ArborFlow** provides attenuation within the tree pit as well as absorption into the surrounding ground and by the tree's root system - a mature tree has the capacity to absorb over 200 litres (52.8 gal) of water a day.



An **ArborFlow** system markedly reduces the velocity and flow rate of surface water run-off in urban areas. The system can be designed to assist with meeting discharge rates allowed and set by regulatory authorities. It stores, cleans and gradually releases the stormwater and additionally provides for healthy growth of trees and other urban planting. This planting feature provides amenity and biodiversity, but more importantly, assists in the management of storm water events, as plants hold rain water on the leaf structures, assist in water movement through the planting medium, and actually draw water out of the system for their own vascular use. As a tree grows, it continues

to improve in efficiency; a larger tree holds and draws more water, providing a measure of climate change adaptability.

The **ArborFlow** design allows the water to either be discharged into the surrounding subsoil, to be absorbed by the trees' root systems, or to find its way into the specially designed flow-control chamber positioned on the outfall of the tree pit.

Please contact a member of the **GreenBlue Urban** technical team for assistance with any of your schemes. We're looking forward to hearing from you.

Benefits

- Ideal for use in an urban environment where lack of space is a challenge
- Prevents flooding as it absorbs and contains water in the tree pit system
- Reduces the flow rate of water run-off so that the system meets authorities' allowable discharge rates
- Surface water is either discharged into surrounding subsoil, absorbed by roots or flows into tree pit's control chamber
- Drainage channels trap salt and other organic matter, such as leaves
- Manages water run-off at source, or as close as possible to the point where water falls
- 100% post-consumer materials used have minimal or zero-impact on environment
- Increases chances of newly planted trees reaching their full potential
- Design and implementation meet new planning guidelines and regulations
- Materials used are also recyclable at the end of their life

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ArborFlow™ 100 Series

SuDS / LID tree pit system



This innovative product brings a new tool to the urban designer's toolkit. A modular tree planting system specifically designed to bring measurable and sustainable benefits in stormwater management when planting trees in paved surrounds.

The dual purpose interlocking panel system (patent applied for) provides water storage, dispersion, filtration and tree root management.

Benefits

- Measurable proven water attenuation capability
- Fast water dispersion below ground
- Linear or surround application
- Flexible tree pit size
- Fast Installation
- No specialist lifting equipment or installation techniques required
- Integral root training to prevent paving root heave
- Flood level indicator
- Maintainable pre-treatment gullies
- Simplicity of maintenance
- Able to be installed as 'standalone' or an integral part of a SuDS / LID train
- Designed for retro fitting into established streetscapes

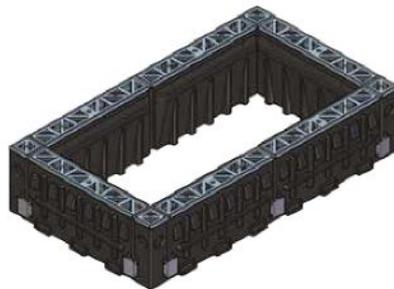


Figure 2: View showing a six panel, four corner assembly configuration (ArborFlow 200)



Figure 3: Top view - showing grille design and flood level indicator

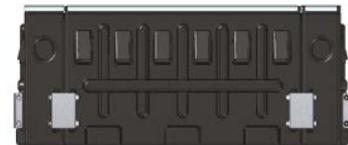


Figure 4: Side view of panel plus two corners

Product codes and specifications

A system to suit your site - standard packages easily adapted to both site conditions, budget, tree type, water attenuation requirements.

Product Code	Panel Configuration Panels + Corners	Outer Tree Pit Dimensions W x L X D Inc. cells	Water Attenuation Capacity	System
GBUABF100A	4 + 4	1500 x 1500 x 1000mm (59.1" x 59.1" x 39.4")	250 litres (55 Gal)	ArborFlow 100
GBUABF200A	6 + 4	2000 x 1500 x 1000mm (78.7" x 59.1" x 39.4")	450 litres (98.9 Gal)	ArborFlow 200
GBUABF300A	8 + 4	2000 x 2000 x 1000mm (78.7" x 78.7" x 39.4")	950 litres (208.9 Gal)	ArborFlow 300

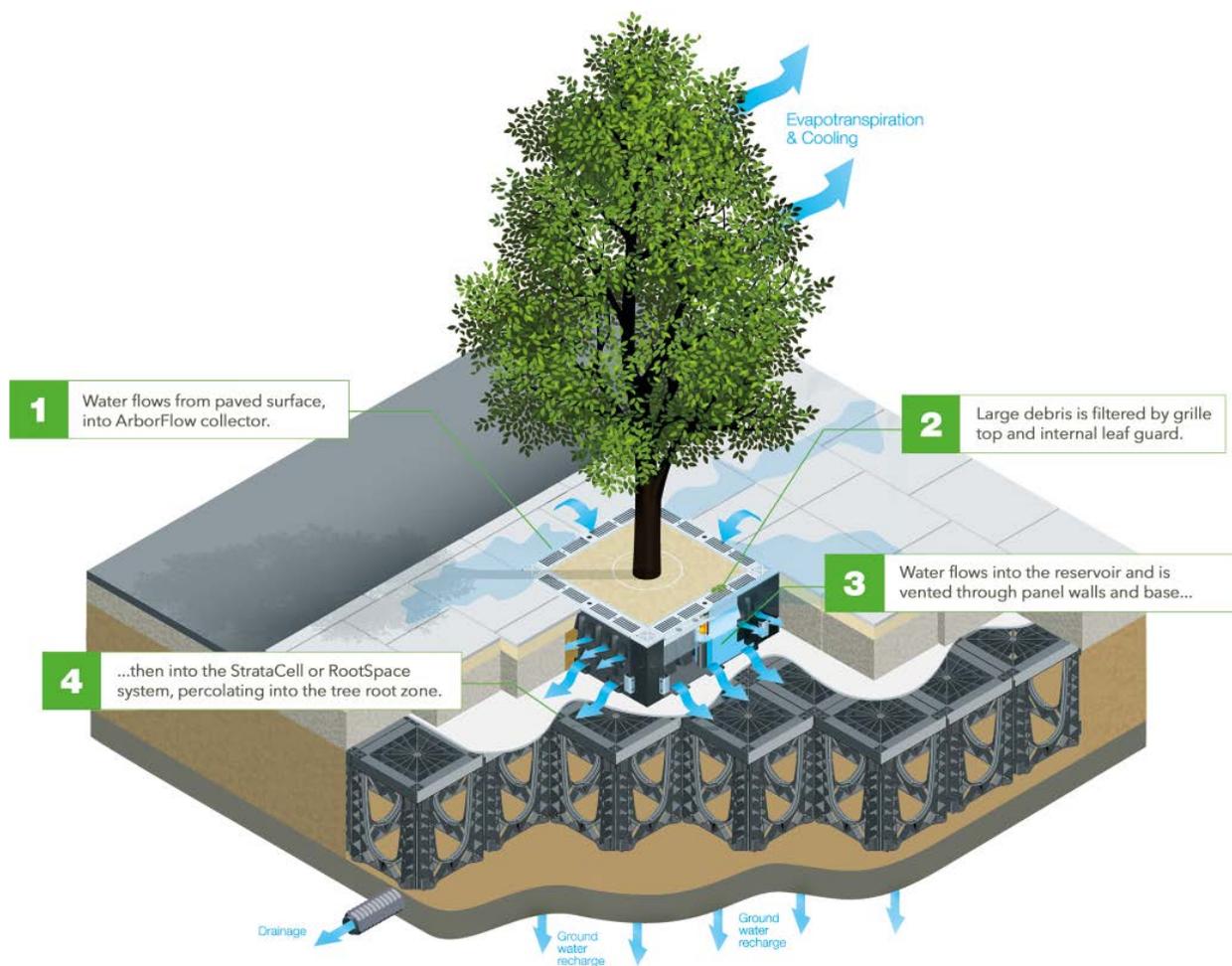
ArborFlow™ 100 Series

How it works

Rain falls - (as tree grows, canopy interception increases,) surplus runoff flows into **ArborFlow** collector channel, with first stage filtration, then into the panel reservoir.

Water is collected, stored and dispersed through the panels, into the surrounding root zone **StrataCell** or **RootSpace** system - allowing ground recharge, utilizing storage capacity in the ArborSoil-Hydro substrate.

Eventually, as the tree pit nears field capacity, the water begins to flow towards the next stage of the drainage system or SuDS / LID train.



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High Capacity WSUDS Package

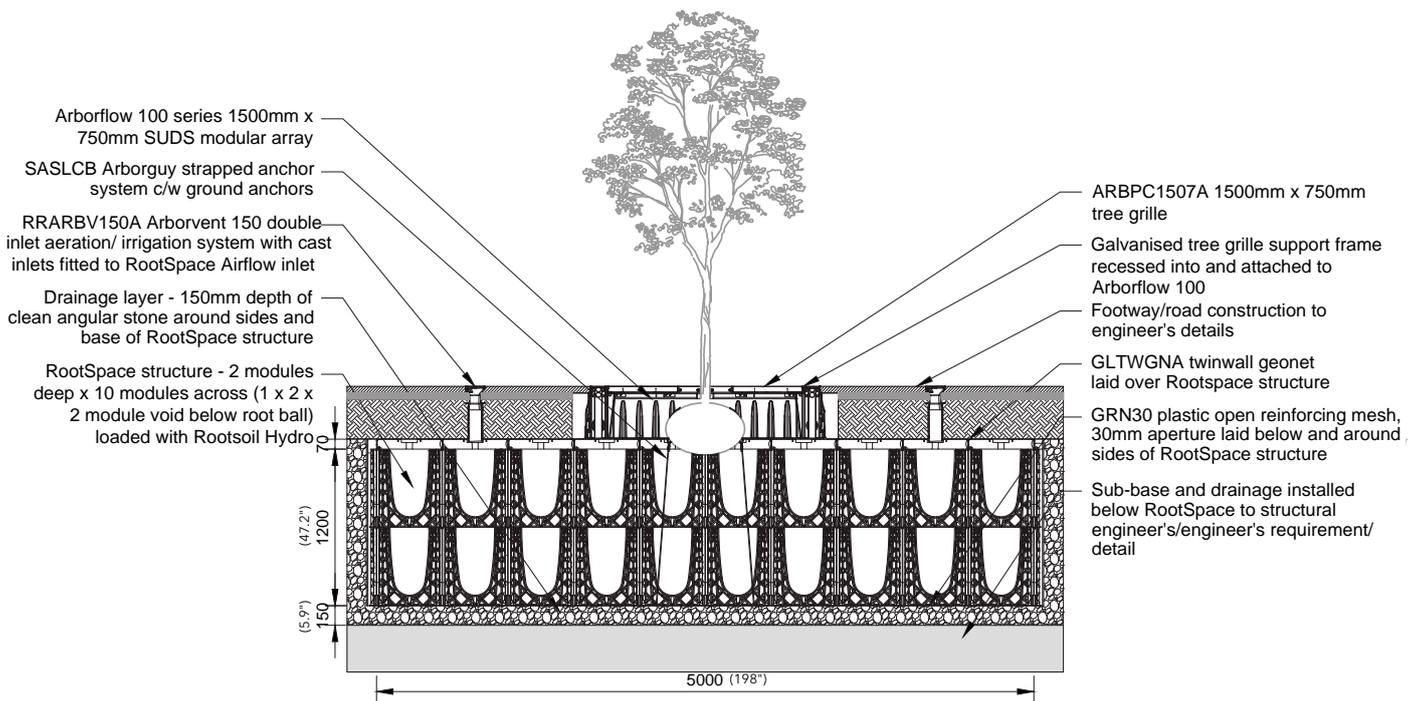
SuDS / LID Tree Pit System

Goldhawk Case Study

[View the Goldhawk case study on page 214 to see how a WSUDS Package was used successfully.](#)

By utilizing the **ArborFlow 100** series tree package, specifiers can simply scale up the **RootSpace** structure or link tree pits in series to meet project requirements.

Linking tree pits together not only provides more attenuation volumes, but dramatically increases the available rooting area for long term tree growth.



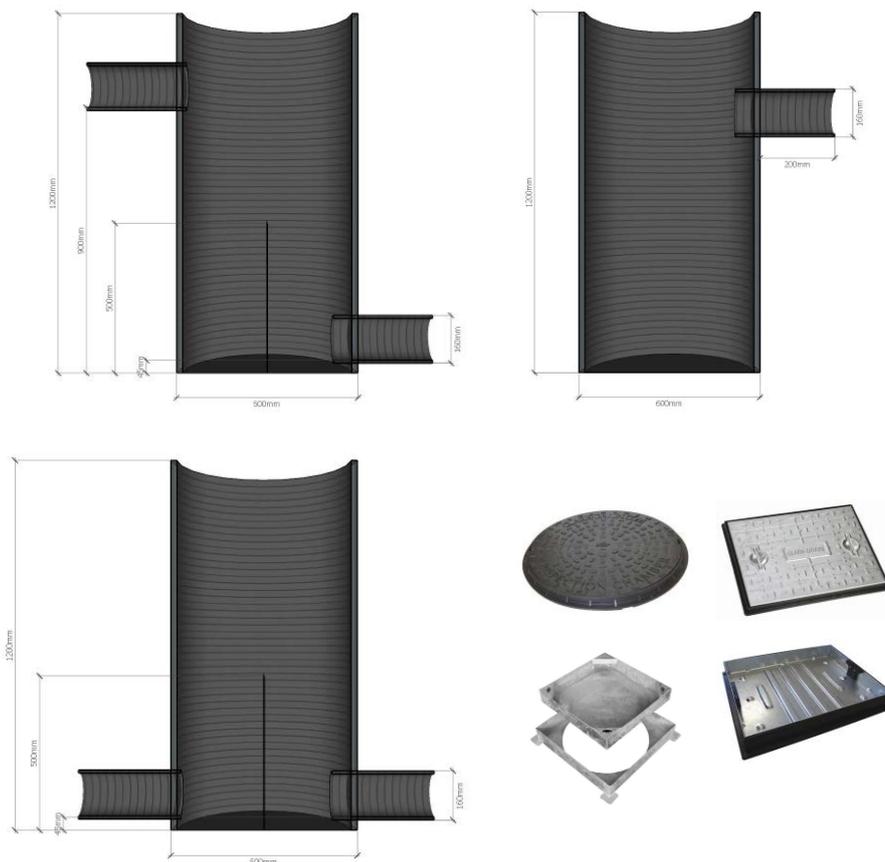
Control Chamber

Configurable silt trap / flow control system

GBU SuDS control chamber is a system which is bespoke manufactured to individual requirements.

Variable inlet / outlet levels can be catered for, and the chamber can be adopted either as a silt trap or a flow control chamber.

Depths, diameters, features, outlets, can all be configured to optimise tree pit attenuation performance.



Control chambers are available in a variety of configurations in order to suit your application needs.

The control chamber can be accessed for inspection through a cover available in two finishes.

Benefits

- Heavy duty plastic construction
- Variety of manhole cover styles
- Full suite of features and options

Features

- Full design and manufacturing expertise
- Some options are configurable on site to adapt to varying conditions
- Suitable for many different applications within the full SuDS train
- Very robust construction



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ArborCell

Water attenuation cell for SuDS tree pits



GreenBlue Urban ArborCell water attenuation cell is used within **GreenBlue Urban** SuDS tree pits to provide additional attenuation capacity and help distribute water throughout the tree pit.

Providing high load bearing capacity, the **ArborCell** is installed above **RootSpace** and can be paved over, even in the most demanding locations.

Benefits

- 92% void space = maximum attenuation capacity
- Load bearing capacity to suit maximum vehicle loadings
- No tools required for installation

Features

- Open mesh construction base and cap
- Simple click together format
- Removable sections for pipe connections



Product Specifications and codes

Code	Depth	Width x Length
GBUABC150A	150mm (5.9")	400 x 800mm (15.74" x 31.5")
GBUABC80A	80mm (3.15")	400 x 800mm (15.74" x 31.5")

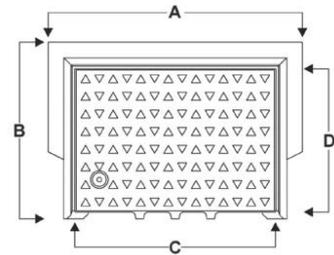
*Sold in the UK only.

Kerb/Curb Flow Inlet

Storm water inlet for incorporation in road side SuDS / LID tree pit designs

Heavy duty steel inlet, available in both Corten and galvanized steel. This inlet gives a simple and durable means of conveying rain water run-off into the catchment zone for attenuation.

The inlet is also available with closable valve option operated with a simple tool, so that in the event of prolonged winter waterlogging bringing a risk of over saturation to the tree pit, the installation can be quickly isolated. This may also be needed in areas liable to occasional pollutant or heavy de-icing salt intakes.



Benefits

- Class 3 D400 tested loading capacity
- Easy to maintain
- Security features reduce theft risk
- Kitemarked to BSEN 124:2015

Features

- Durable cast iron construction
- Locking lid for maintenance access
- 160mm (6.3") spigot for joining to SuDS / LID tree pit
- Matches typical kerb dimensions



Standard kerb flow inlet used on Goldhawk Road. See more on page 175.

Product Specifications and codes

Code	Clear opening size (C X D)	Frame depth	Over frame size (A X B)	Base opening
GBUCIKI500A	500 x 350mm (19.7" x 13.7")	150mm (5.92)	645 x 445mm (25.4" x 17.5")	525 x 370mm (20.7" x 14.6")



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3

Spending time near trees **improves physical and mental health** by increasing energy level and speed of recovery, while decreasing blood pressure and stress.

Cross Street, Welland, Ontario

Complete Tree Pit Systems

■	GBU2101	Soft verge corridor planting	118
■	GBU2102	Soft landscaping over services	120
■	GBU2103	Standard car park detail with shallow services (small soil volume)	122
■	GBU2104	Standard car park tree (small soil volume)	124
■	GBU2105	Linear car park tree trench	126
■	GBU2106	Shallow tree pit in hard surface	128
■	GBU2107	Medium depth tree pit in hard surface (medium soil volume)	130
■	GBU2108	Car park diamond detail	132
■	GBU2109	Shallow podium detail small species tree	134
■	GBU2110	High soil volume, large tree species	136
■	GBU2111	ArborFlow WSUD package	138
■	GBU2112	Linear car park soft landscape strip	140
■	GBU2113	Small species standard car park detail	142
■	GBU2114	Medium species car park detail	144
■	GBU2115	Small species car park detail with vertical guard	146
■	GBU2116	Tree in soft with additional rooting volume	148
■	GBU2117	Large species car park detail	150
■	GBU2118	SuDS / LID permeable paved landscape strip detail	152
■	GBU2119	SuDS build out tree pit (small tree species)	154



3 Miami Central, Miami, Florida

Tree Product Packages

Specification made simple

To simplify the specification and installation of our range of products, we show in these pages a series of tree pit details.

These have been drawn in consultation with landscape architects and tree planting professionals. All **GreenBlue Urban** line drawings are available in CAD, DWG or DXF and PDF format. Please visit greenblue.com/cad-drawings to download these drawings.

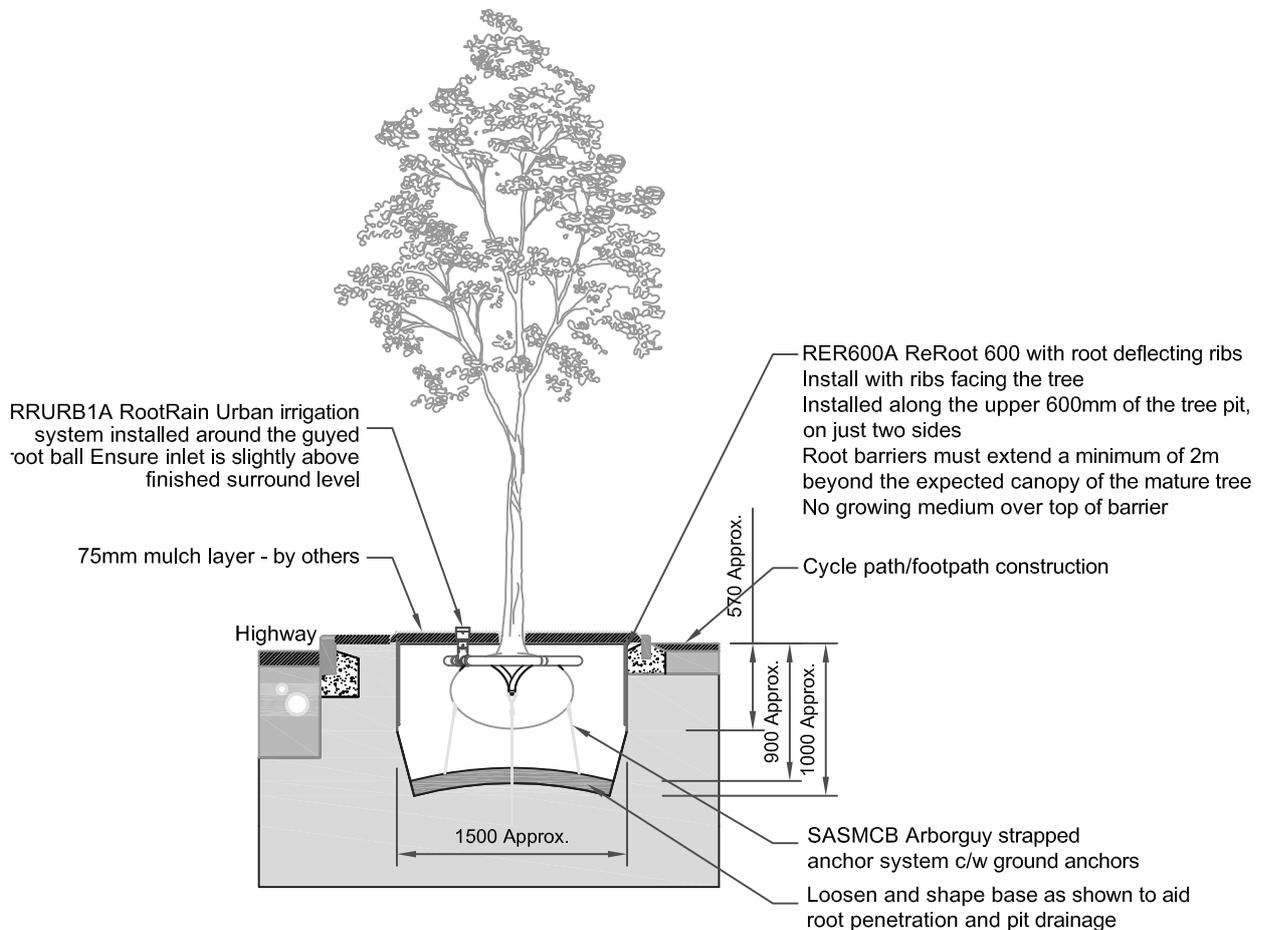
- Assists architects and specifiers in showing how products should be drawn in relation to different location scenarios.
- Facilitates specifying for tree planting with a single product code - a real time saver.
- Adaptable for different locations.
- Contractors can order utilising a single product code and quantities.
- Ensures product compatibility.
- Please note - soil volumes indicated are approximate

GBU2101

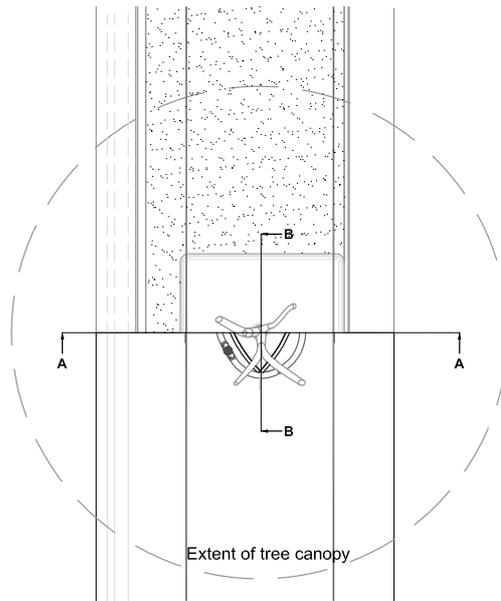
Soft verge corridor planting

Package includes:

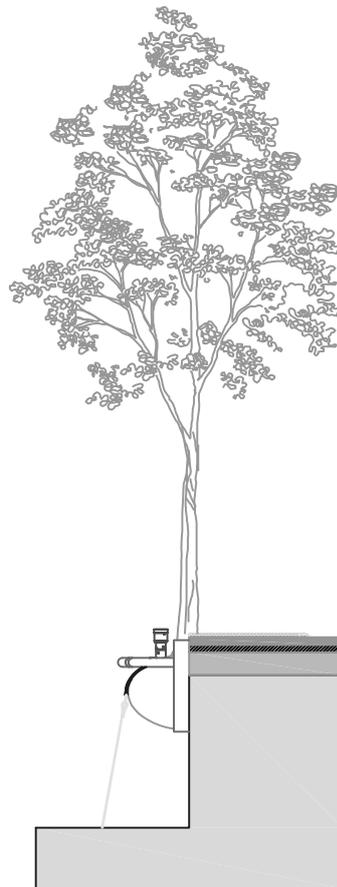
- RRURB1A RootRain Urban aeration/irrigation system
- RER600A ReRoot 600 ribbed root barrier
- RERJTA ReRoot Jointing tape
- SASMCB Arborguy strapped anchor system - medium
- Special drive rod kit required for SASMCB installation
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree



SECTION A-A



PLAN WITH CANOPY HIDDEN



SECTION B-B

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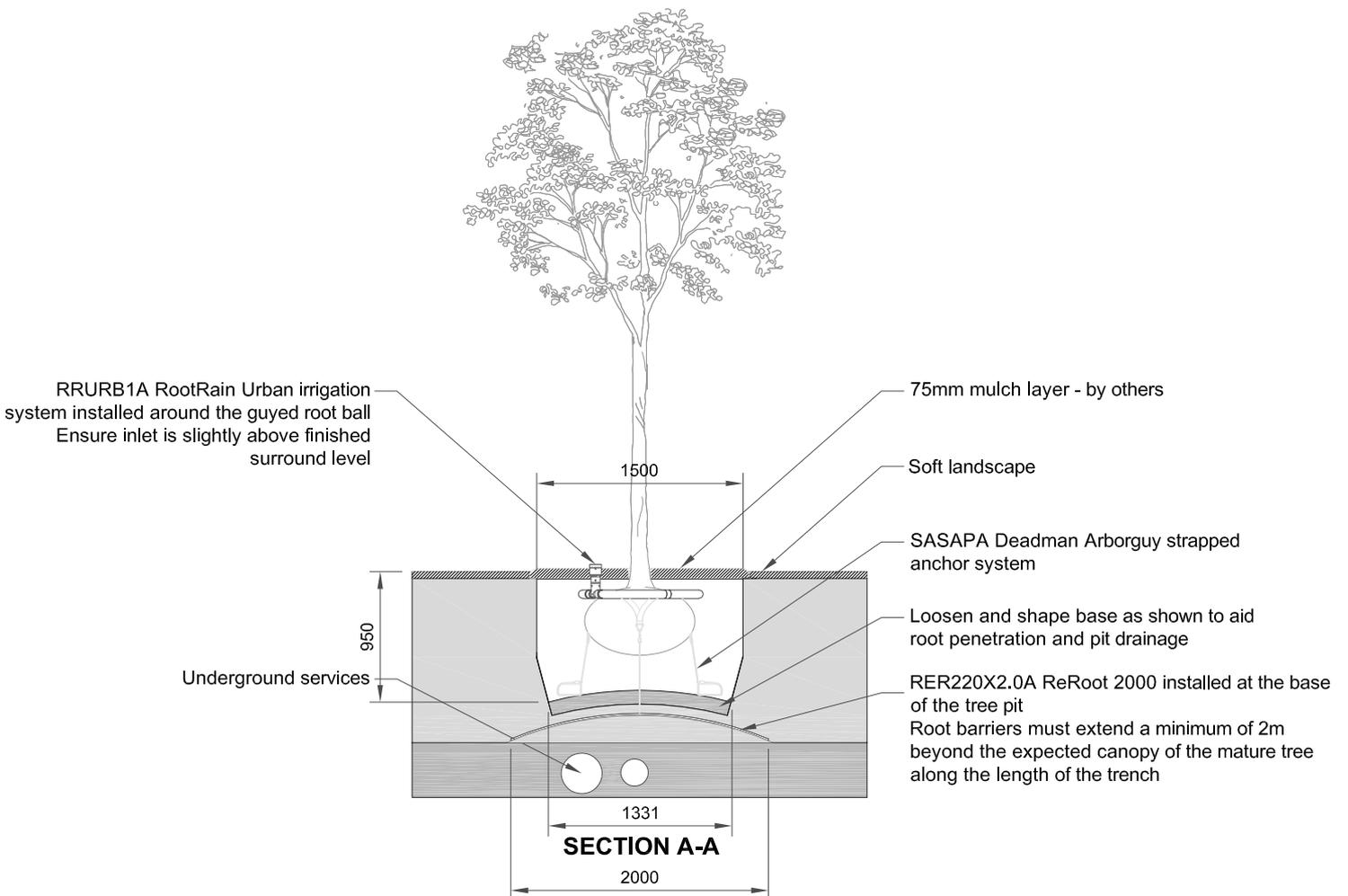
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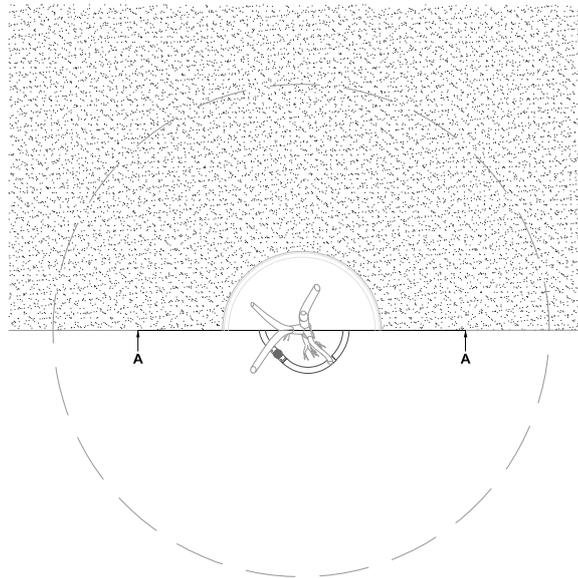
GBU2102

Soft landscaping over services

Package includes:

- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRURB1A RootRain Urban irrigation system
- RER220X2.0A ReRoot 2000 root barrier
- RERJT A Re Root Jointing tape
- *SASDMB Deadman Deadman weights not Arborguy included, to strapped be supplied anchor by system others*





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GBU2103

Standard car park detail with shallow services (small soil volume)

Package includes:

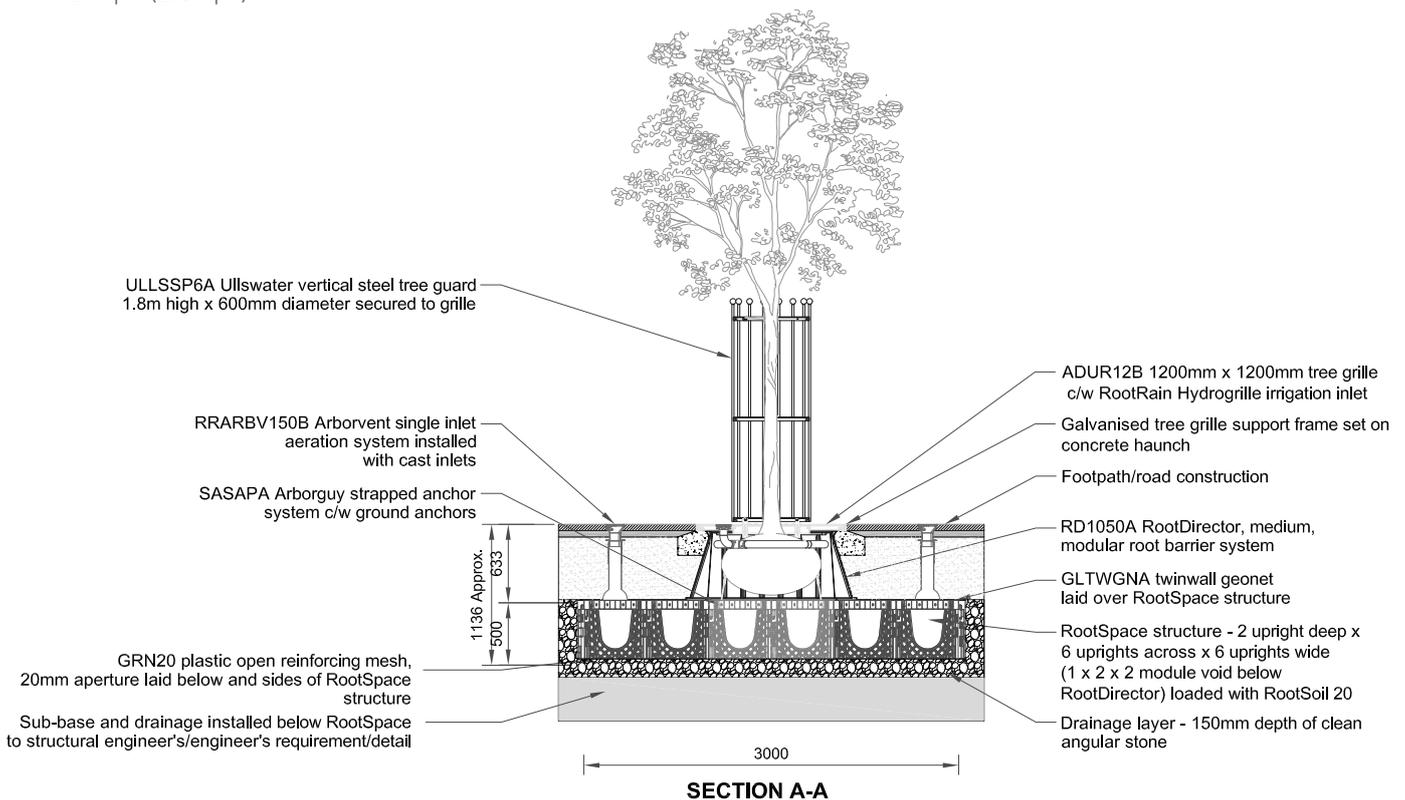
- GBURAC400B RootSpace uprights - 80 No. 500mm (19.7") x 70mm (2.8") x 400mm (15.7") per tree
- GBURACS00B RootSpace Airflow deck - 32 No. 500mm (19.7") x 500mm (19.7") x 75mm (3")
- Rootsoil 20 to fill RootSpace and Root Director spaces (including root ball volume) - allow 3.6 cu. m (127.1 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRARBV150B Arborvent 150 single inlet aeration system with cast inlets including 0.75m (2.46 ft) 100mm (3.9") diameter pipe
- RD1050A RootDirector- Medium
- GL TWGNA twinwall geonet - 9 sq. m (96.9 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 21 sq. m (226 sq. ft)
- SASAPA Arborguy strapped anchor system - large
- ULLSSP6A Ullswater vertical steel tree guard, with rolled angle-section rings, 16mm (0.6") round vertical bars topped with 50mm diameter ball finials, finished in black
- ADUR12B Adur 1200mm (47.2") x 1200mm (47.2") tree grille, finished in black with galvanised steel support frame c/w RootRain Irrigation

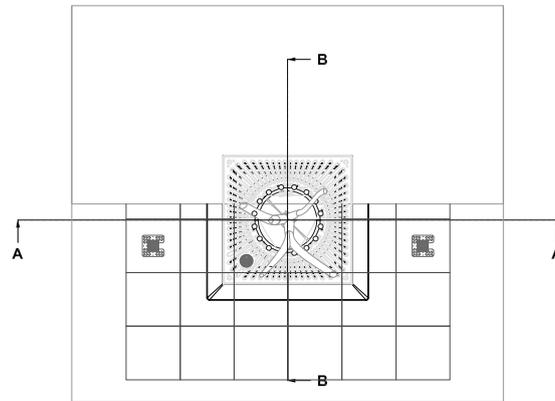
Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

For heavy load applications, install RootSpace side panels to installation as directed by engineer

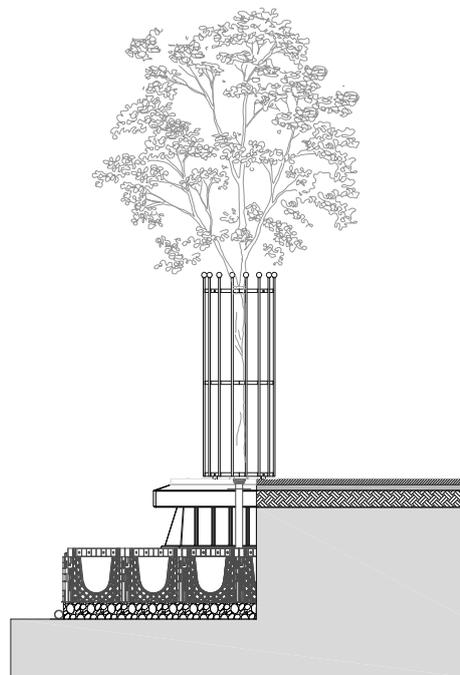
Structural engineer's note:

For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to incorporate side panel inserts to tree pit perimeter





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GBU2104

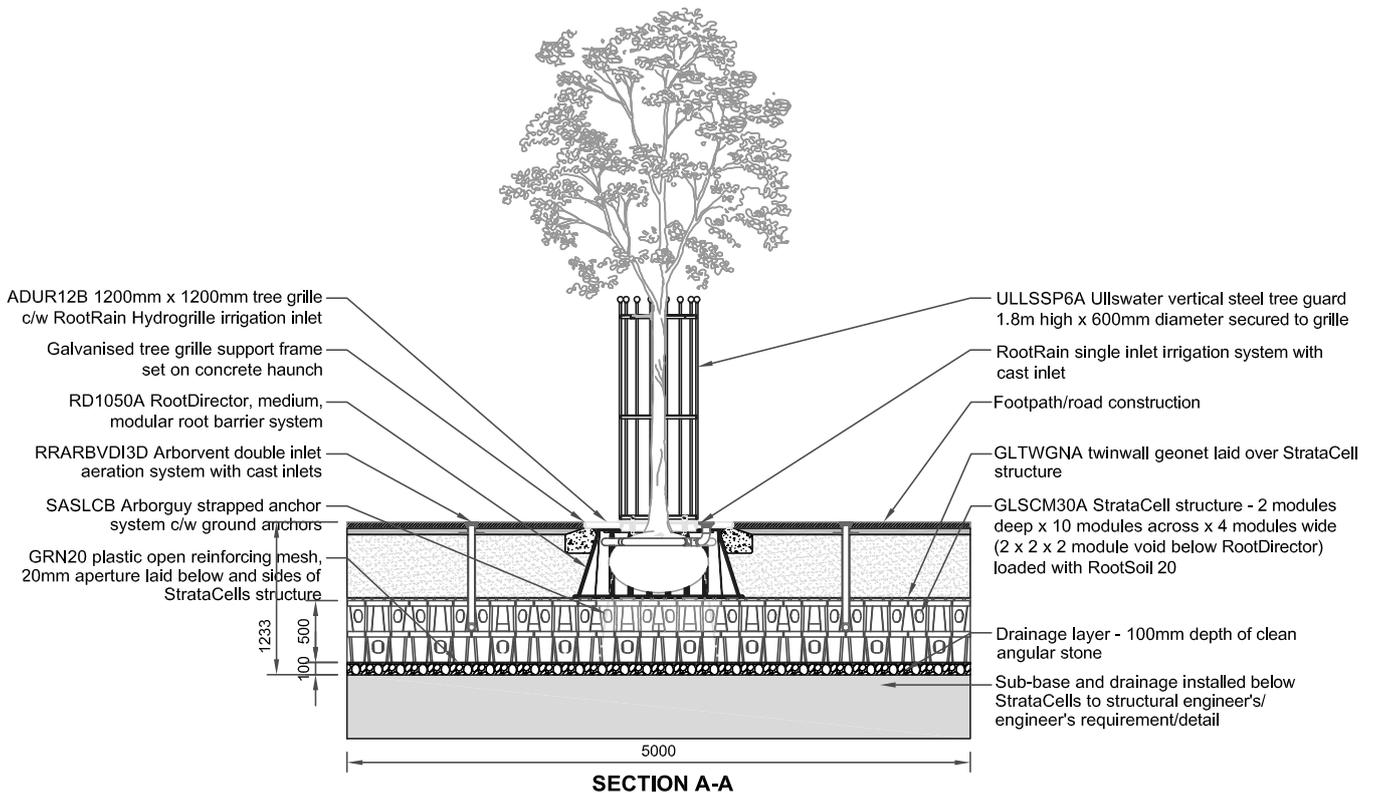
Standard car park tree (small soil volume)

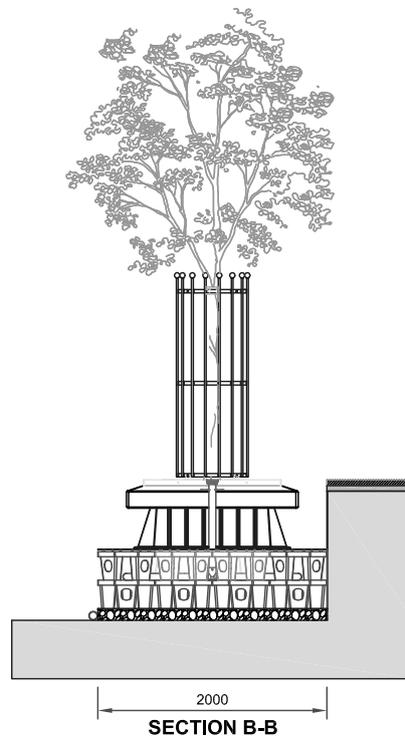
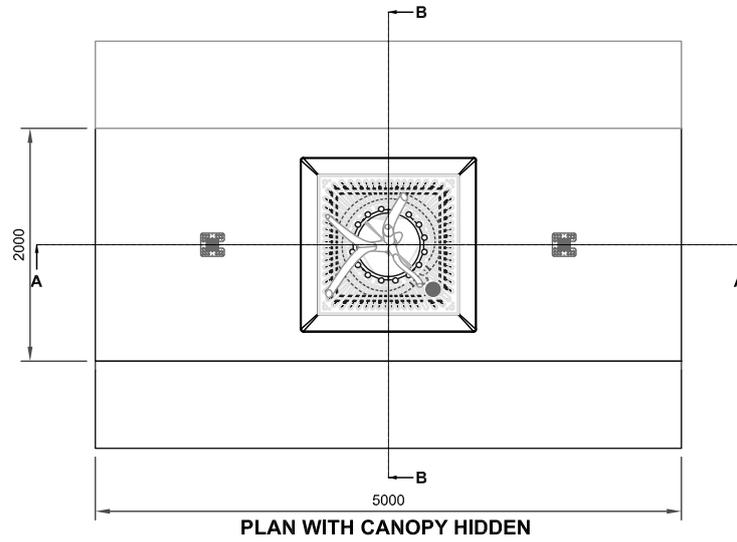
Package includes:

- GLSCM30A StrataCells - 72 No. 500mm (19.7") x 500mm (19.7") x 250mm (9.8")
- Rootsoil 20 to fill StrataCell and Rootdirector spaces (including root ball volume) - allow 5 cu. m (176.6 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRARBVDI3D Arborvent double inlet aeration system with cast inlets
- RD 1050A Rootdirector - Medium
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 24 sq. m (258.3 sq. ft)
- SASLCB Arborguy strapped anchor system - large
- ULLSSP6A Ullswater vertical steel tree guard with rolled angle-section rings, 16mm (0.6") round bars topped with 50mm diameter ball finials, finished in black
- ADUR12B Adur 1200mm (47.2") x 1200mm (47.2") tree grille, finished in black with galvanised steel support frame c/w RootRain HydroGrille Irrigation

Note: Special drive rod kit required for SASLCB installation

20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements





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GBU2105

Linear car park tree trench

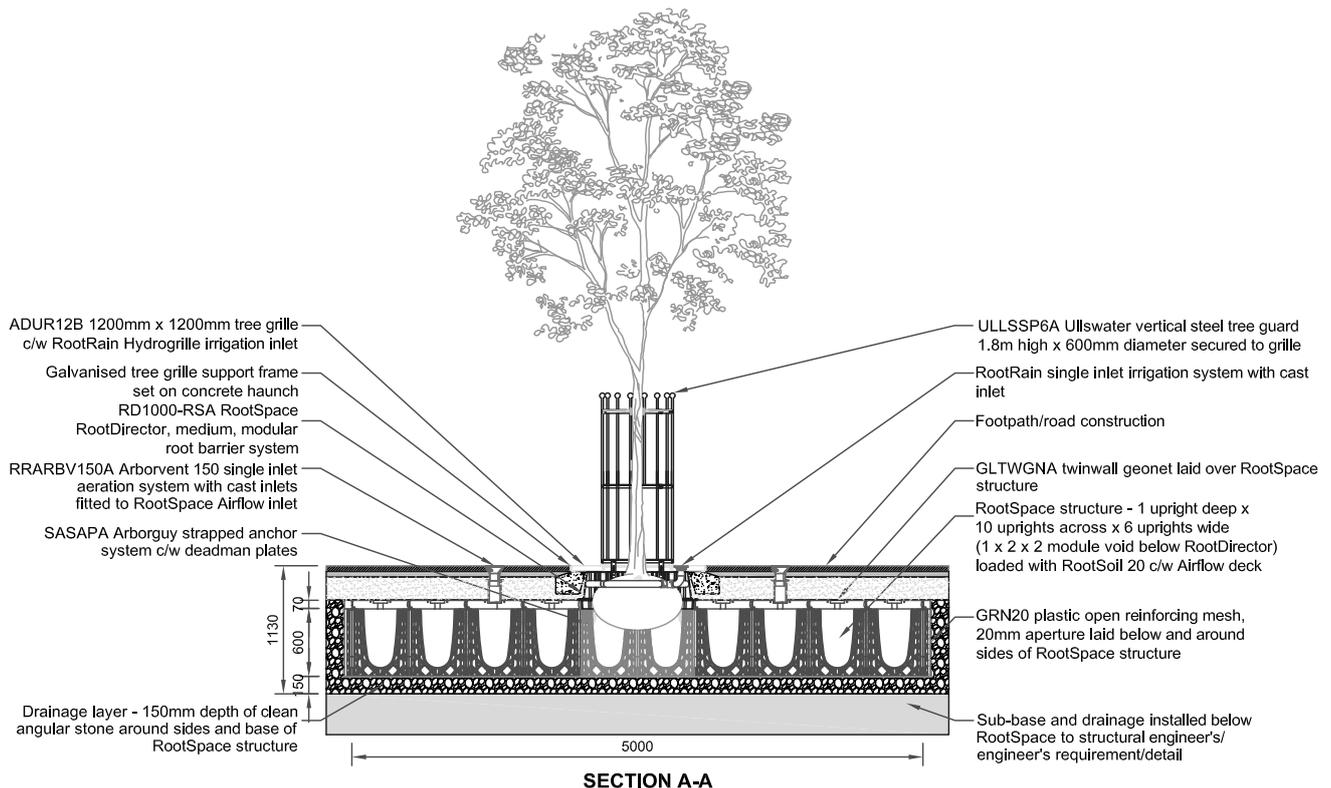
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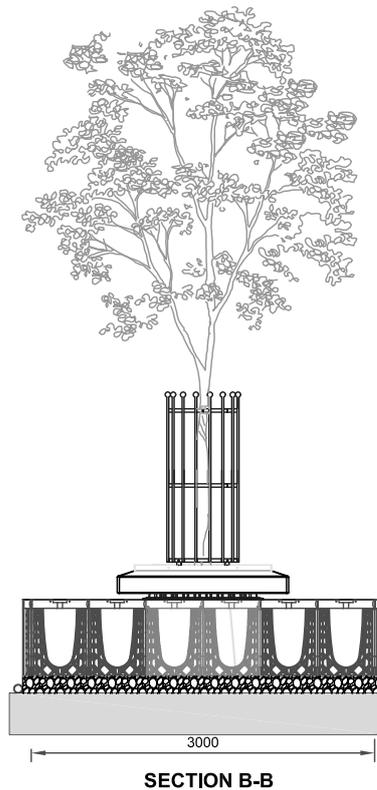
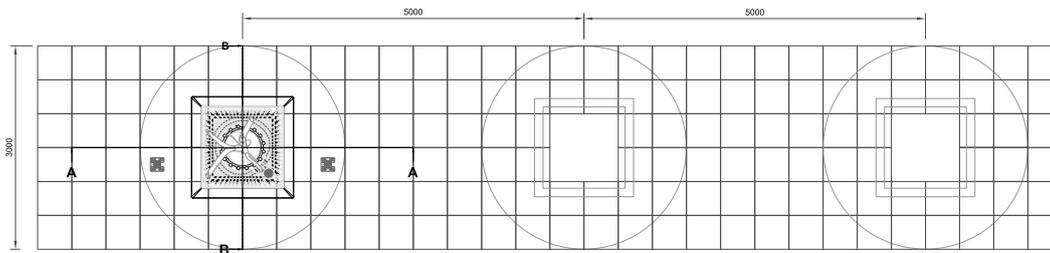
- GBURAC600A RootSpace uprights - 132 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6") per tree
- GBURAC500A RootSpace Airflow deck - 56 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- Rootsoil 20 to fill RootSpace and RootDirector spaces (including root ball volume) - allow 9 cu. m (317.8 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRARBV150A Arborvent 150 single inlet aeration system with cast inlets including 0.75m (2.5 ft) 100mm (3.9") diameter pipe
- RD1000-RSA RootSpace RootDirector - medium
- GL TWGNA twinwall geonet - 15 sq. m (161.5 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 31 sq.m (333.7 sq. ft)
- SASAPA Arborguy strapped anchor system - large
- ULLSSP6A Ullswater vertical steel tree guard with round angle-section rings, 16mm (0.6") round bars topped with 50mm diameter ball finials, finished in black
- ADUR12B Adur 1200mm (47.2") x 1200mm (47.2") tree grille, finished in black, with galvanised steel support frame

Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

For heavy load applications, install RootSpace side panels to installation as directed by engineer

Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter.



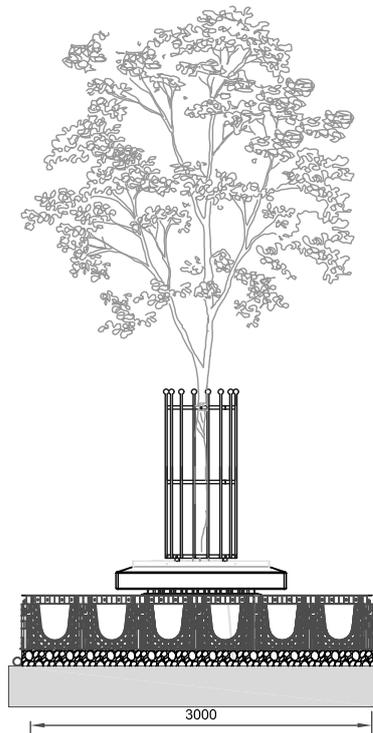
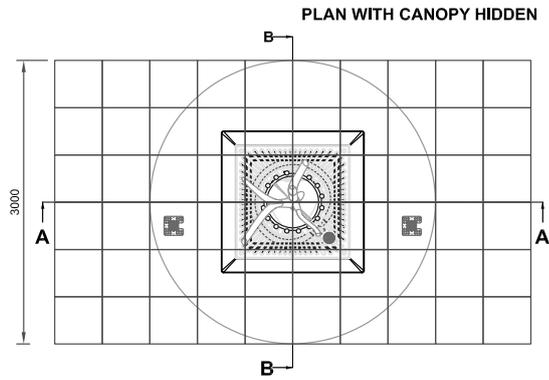


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GBU2107

Medium depth tree pit in hard surface (medium soil volume)

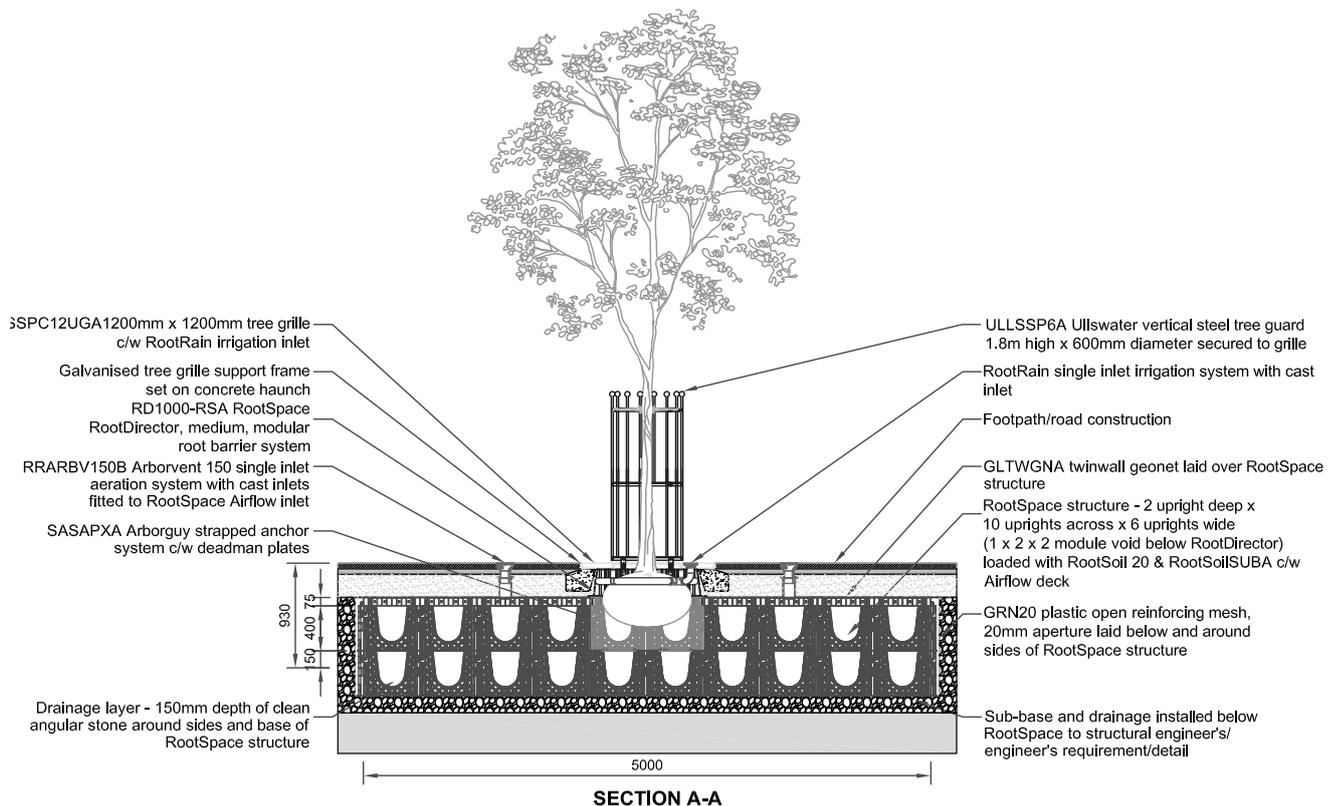
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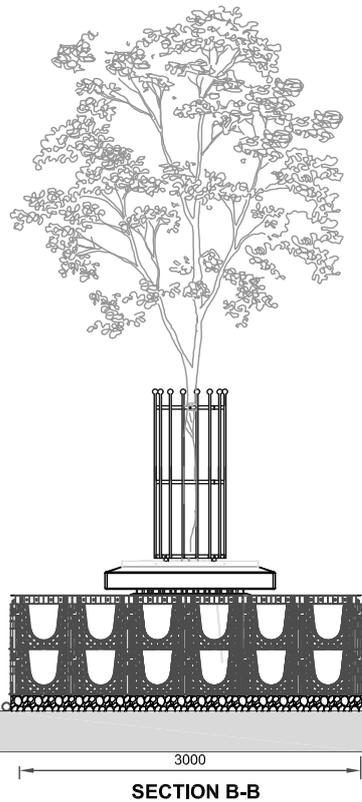
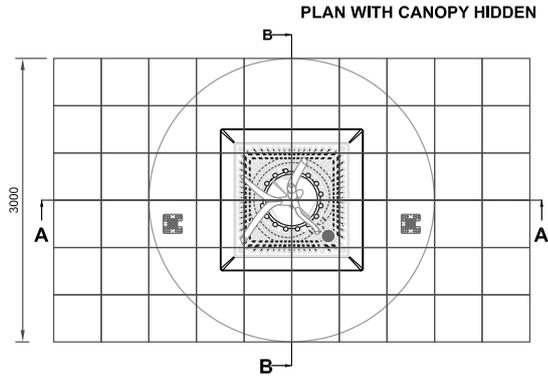
- GBURAC400B RootSpace uprights - 268 No. 500mm (19.7") x 70mm (2.8") x 400mm (15.7") per tree
- GBURAC500B RootSpace Airflow deck - 56 No. 500mm (19.7") x 500mm (19.7") x 75mm (3")
- Rootsoil 20 to fill RootSpace and RootDirector spaces (including root ball volume) - allow 12 cu. m (423.8 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRARBV150B Arborvent 150 single inlet aeration system with cast inlets including 0.75m (2.5 ft) 100mm (3.9") diameter pipe
- RD1000-RSA RootSpace RootDirector - medium
- GL TWGNA twinwall geonet - 15 sq. m (161.5 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 31 sq. m (333.7 sq. ft)
- SASAPXA Arborguy strapped anchor system - large
- ULLSSP6A Ullswater vertical steel tree guard with round angle-section rings, 16mm (0.6") round bars topped with 50mm (2") diameter ball finials, finished in black
- SSPC12UGA SettStone pre cast 1200mm (47.2") x 1200mm (47.2") tree grille, finished with granite block paving, with galvanised steel support frame and integrated irrigation

Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

For heavy load applications, install RootSpace side panels to installation as directed by engineer

Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter





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GBU2108

Car park diamond detail

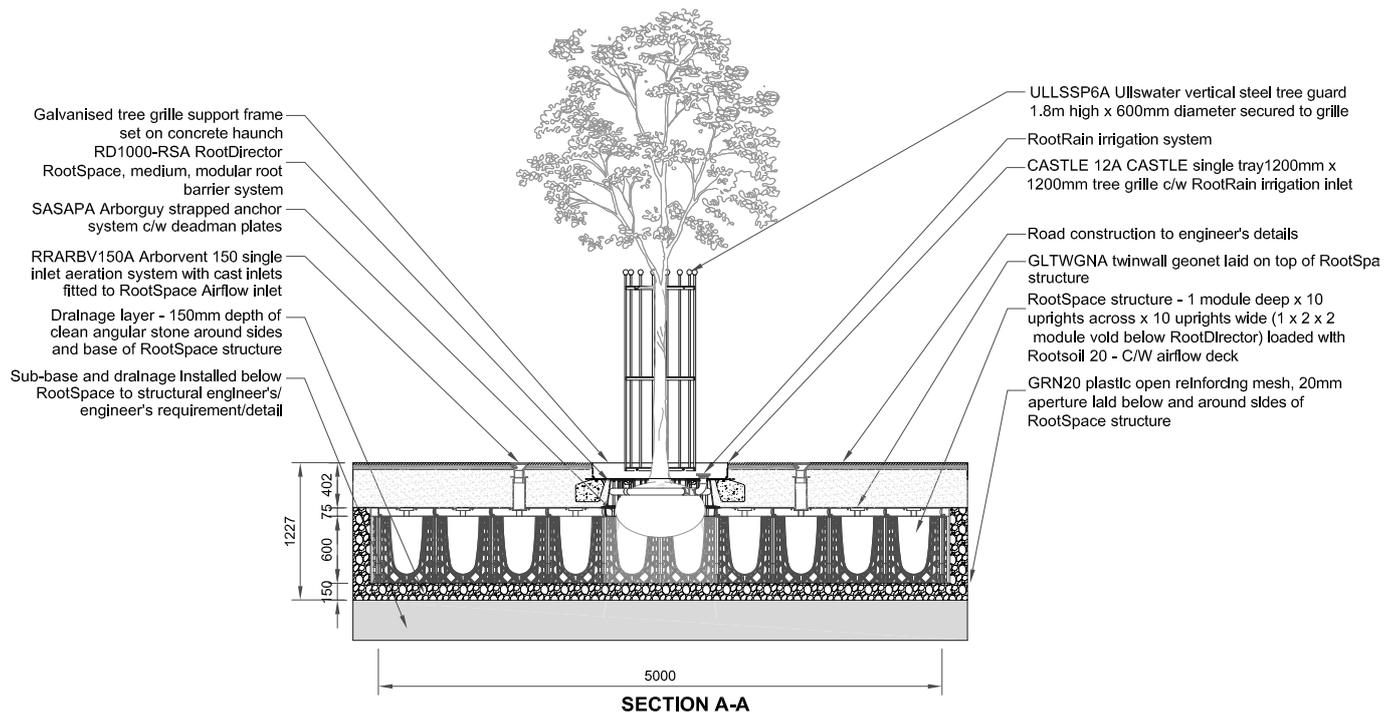
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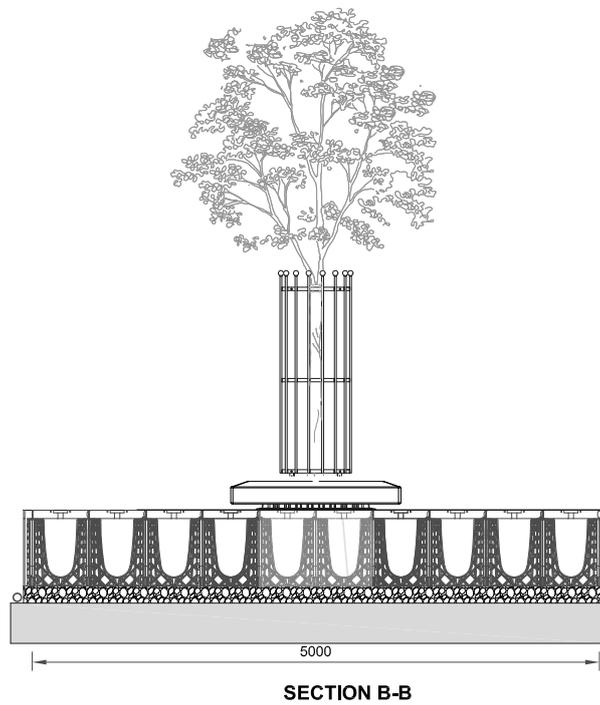
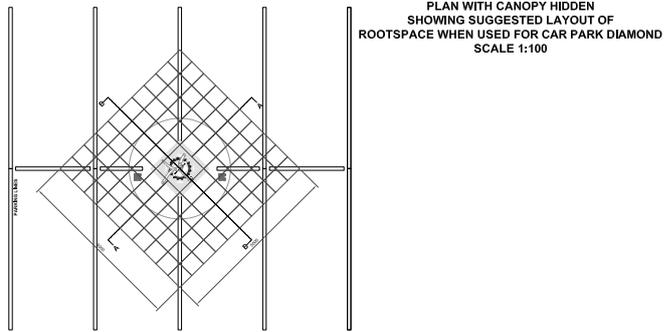
- GBURAC600A RootSpace uprights - 216 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6") per tree
- GBURAC500A RootSpace Airflow deck - 96 No. 500mm (19.7") x 500mm (19.7") x 70mm
- Rootsoil 20 to fill RootSpace and RootDirector spaces (including root ball volume) - allow 15 cu. m (529.7 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRARBV150A Arborvent 150 single inlet aeration system with cast inlets
- RD1000-RSA RootSpace RootDirector - medium
- GL TWGNA twinwall geonet - 25 sq. m (269 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 45 sq. m (484.4 sq. ft)
- SASAPA Arborguy strapped anchor system - large
- ULLSSP6A Ullswater vertical steel tree guard with round angle-section rings, 16mm (0.6") round bars topped with 50mm (2") diameter ball finials, finished in black
- CASTLE 12A Castle 1200mm (47.2") x 1200mm (47.2") single tray tree grille, galvanised finish, with galvanised steel support frame and corner brackets

Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

Structural engineer's note:

For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter





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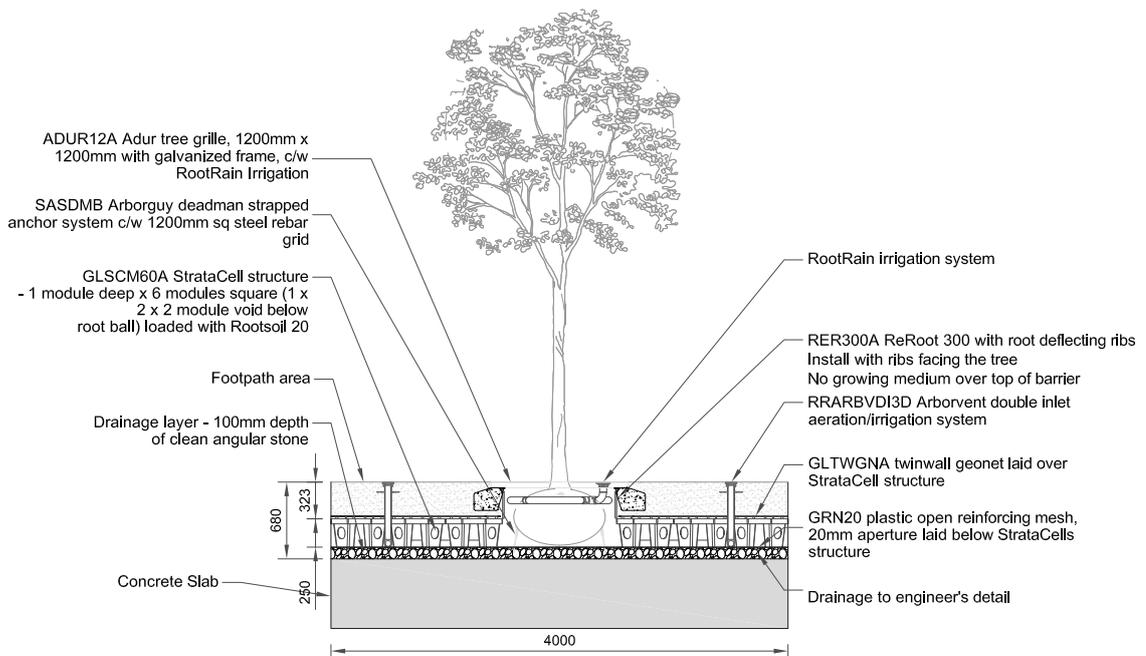
GBU2109

Shallow podium detail small species tree

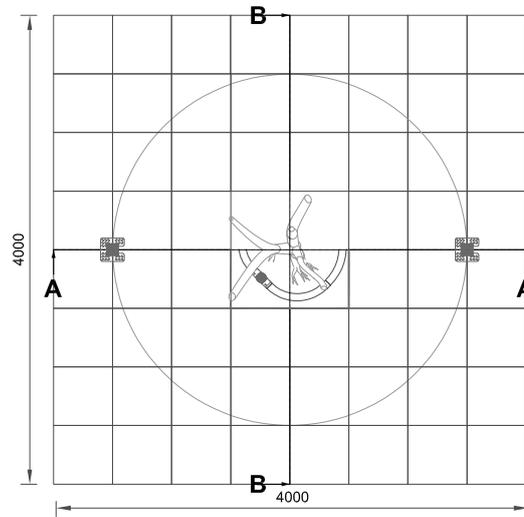
Package includes:

- GLSCM60A StrataCells - 60 No. 500mm (19.7") x 500mm (19.7") x 250mm (9.8")
- Rootsoil 20 to fill RootSpace and Root Barrier spaces (including root ball volume) - allow 4 cu. m (141.3 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree.
- ADUR12B Adur 1200mm (47.2") x 1200mm (47.2") tree grille, finished in black with galvanised steel support frame & integrated irrigation
- RRARBVD13D Arborvent double inlet aeration/irrigation system
- RER300A ReRoot 300 ribbed root barrier - 5m (16.4ft)
- RERJT A Re Root Jointing tape
- GLTWGNA twinwall geonet- 16m² (172.2 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 32 sq. m (344.4 sq. ft)
- SASDMB Arborguy strapped dead man anchor system secured with 1200mm (47.2") sq steel rebar grid underneath root ball

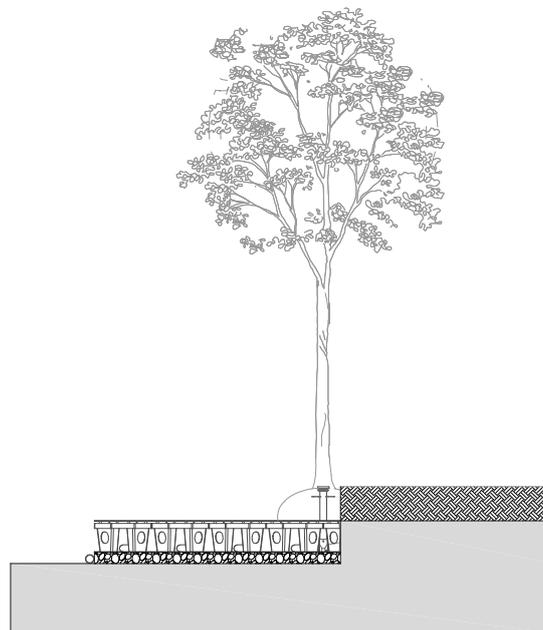
Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements



SECTION A-A



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SECTION B-B



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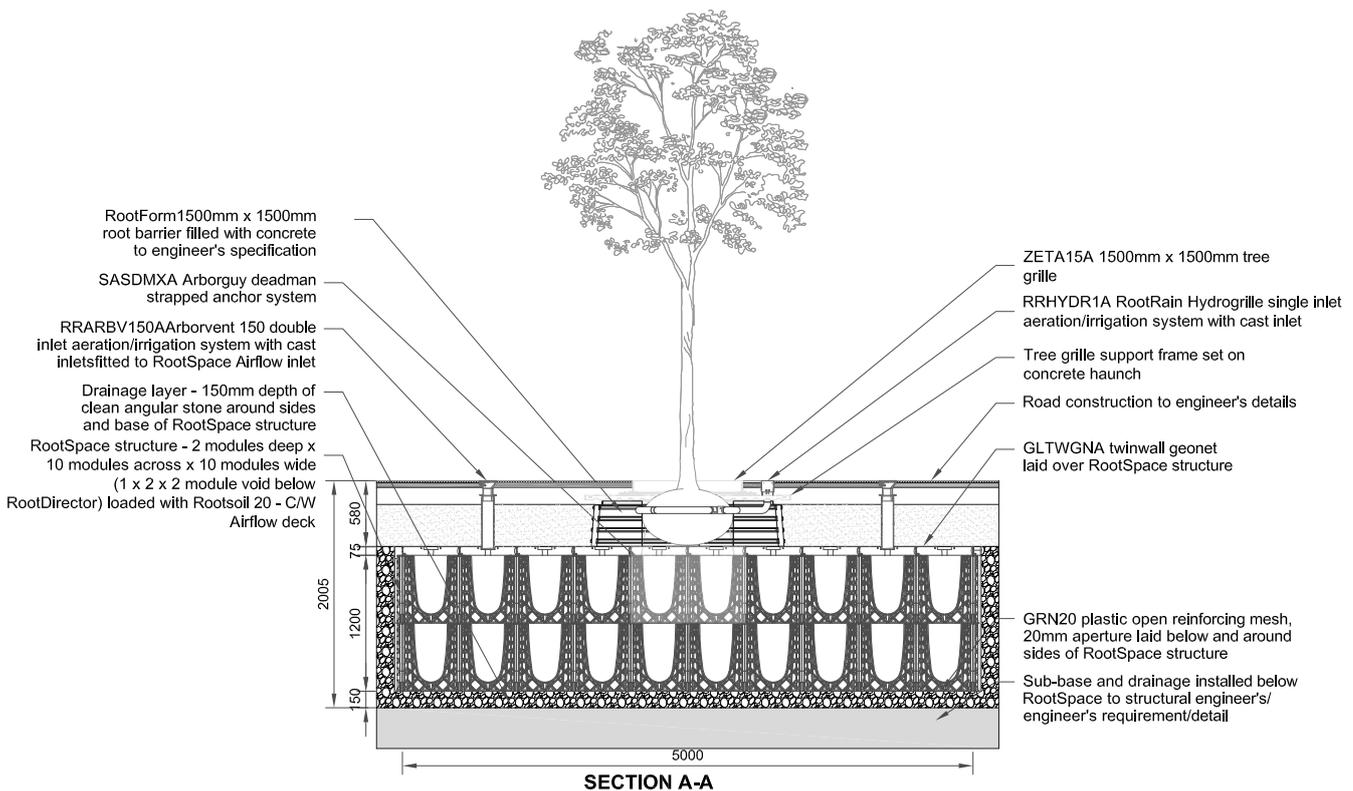
High soil volume, large tree species

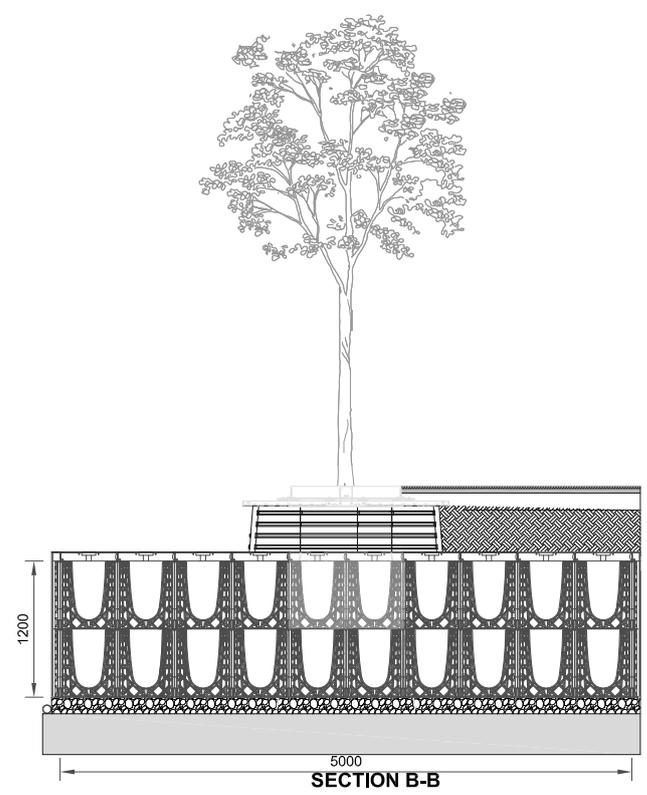
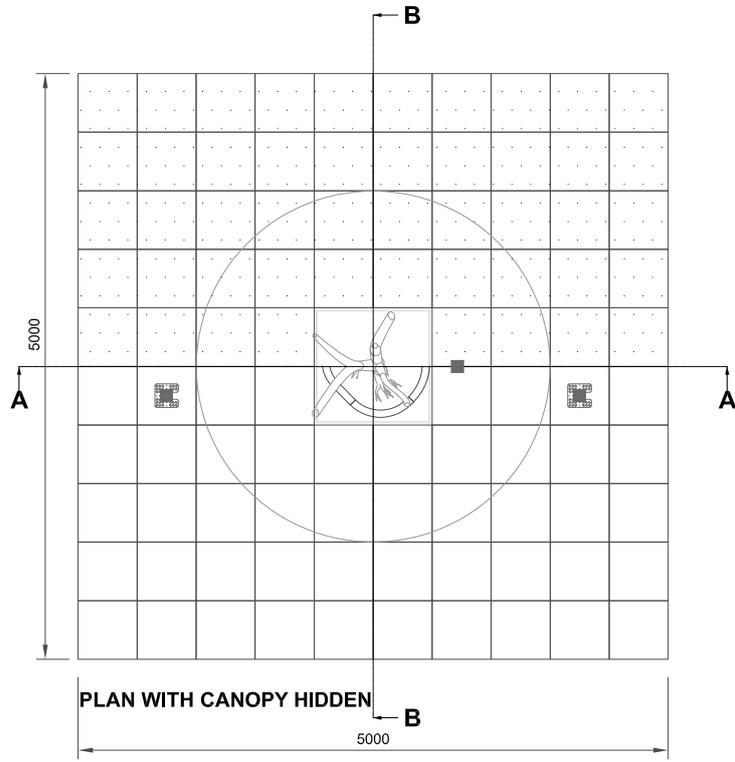
Package includes:

- GBURAC600A RootSpace uprights - 436 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6")
- GBURAC500A RootSpace Airflow deck - 96 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- Rootsoil 20 to fill RootSpace and RootDirector spaces (including root ball volume) - allow 30 cu. m (1,059.4 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRARBV150A Arborvent 150 single inlet aeration system with cast inlets
- 1.5m (4.9 ft) RootForm to support tree grille size.
- GL TWGNA twinwall geonet - 25 sq. m (269.1 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 45 sq.m (484.4 sq. ft)
- SASAPXA Arborguy deadman plated strapped anchor system
- ZETA15A 1500mm (59.1") x 1500mm (59.1") tree grille c/w integrated irrigation

Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter





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GBU2111

ArborFlow WSUD / LID package

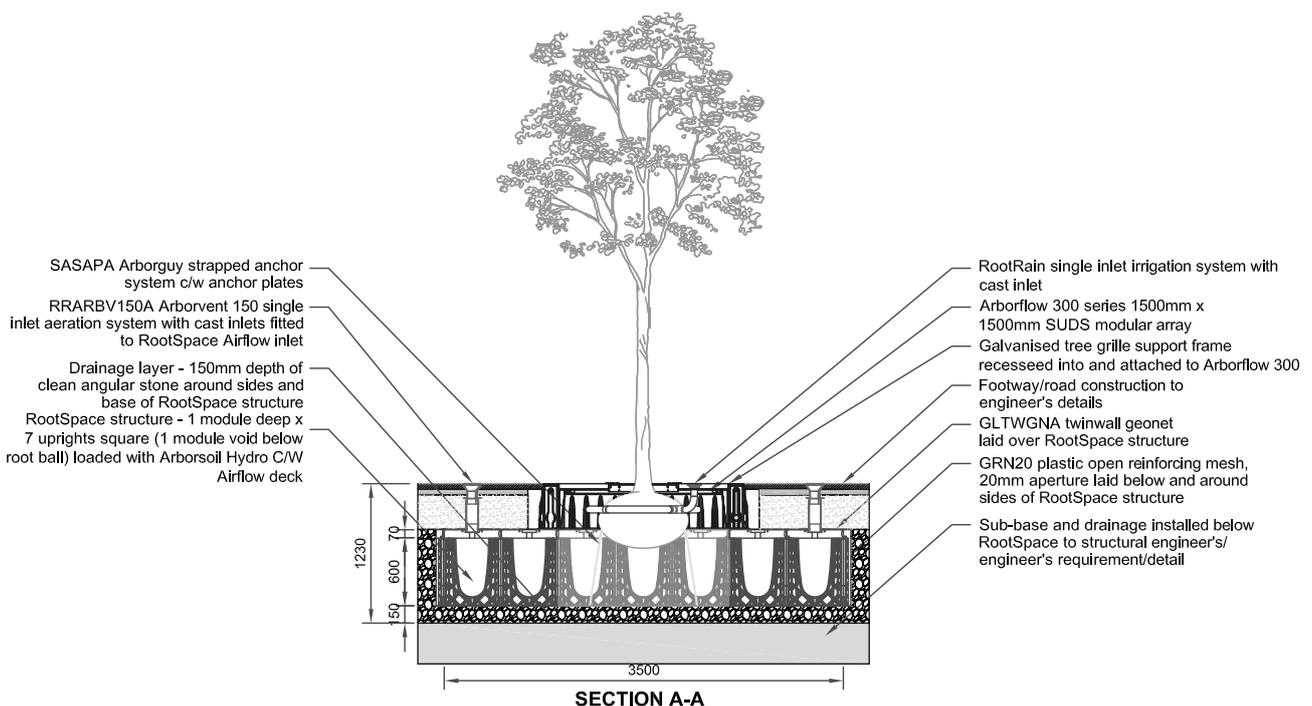
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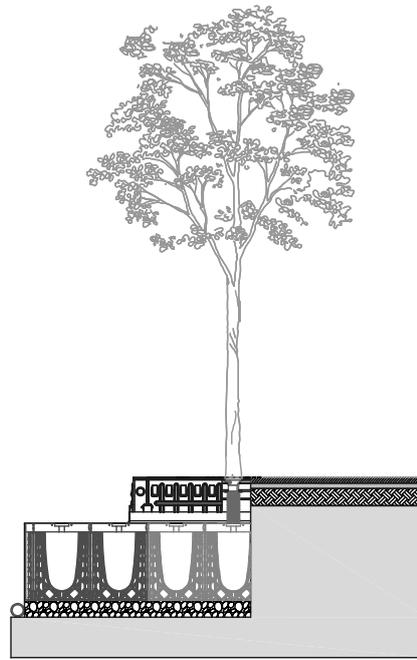
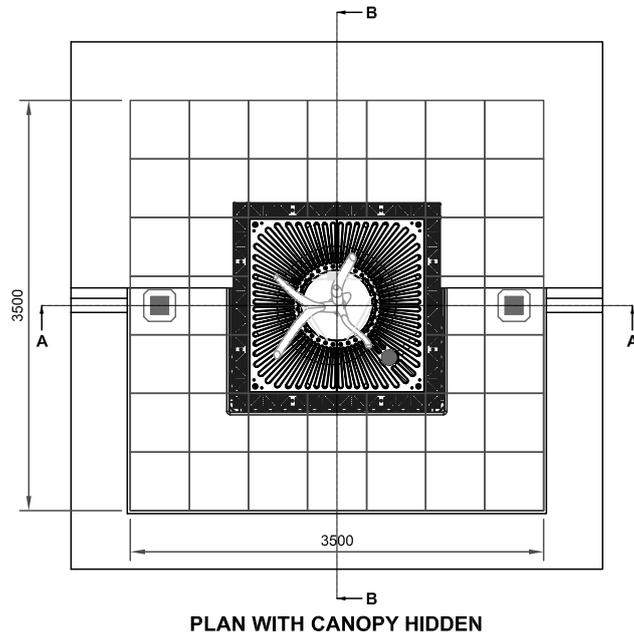
- GBURAC600A RootSpace uprights - 108 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6")
- GBURAC500A RootSpace Airflow deck - 45 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- ArborSoil Hydro topsoil to fill RootSpace and RootDirector spaces (including root ball volume) - allow 9.35 cu. m (330.2 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRARBV150A Arborvent 150mm (5.9") inlet aeration system with cast inlets
- Arborflow 300 SUDS modular array - 8 No. 750mm (29.5") linear modules and 4 No. corner modules
- GLTWGNA twinwall geonet - 12.25 sq. m (131.9 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture -26.25 sq. m (-282.6 sq. ft)
- SASAPA Arborguy strapped anchor system w deadman plates - large
- ADUR15A Adur 1500mm (59.1") x 1500mm (59.1") tree grille, finished in black, with galvanised steel support frame

Note: Special drive rod kit required for SASLCB installation

20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter





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GBU2112

Linear car park soft landscape strip

Package includes:

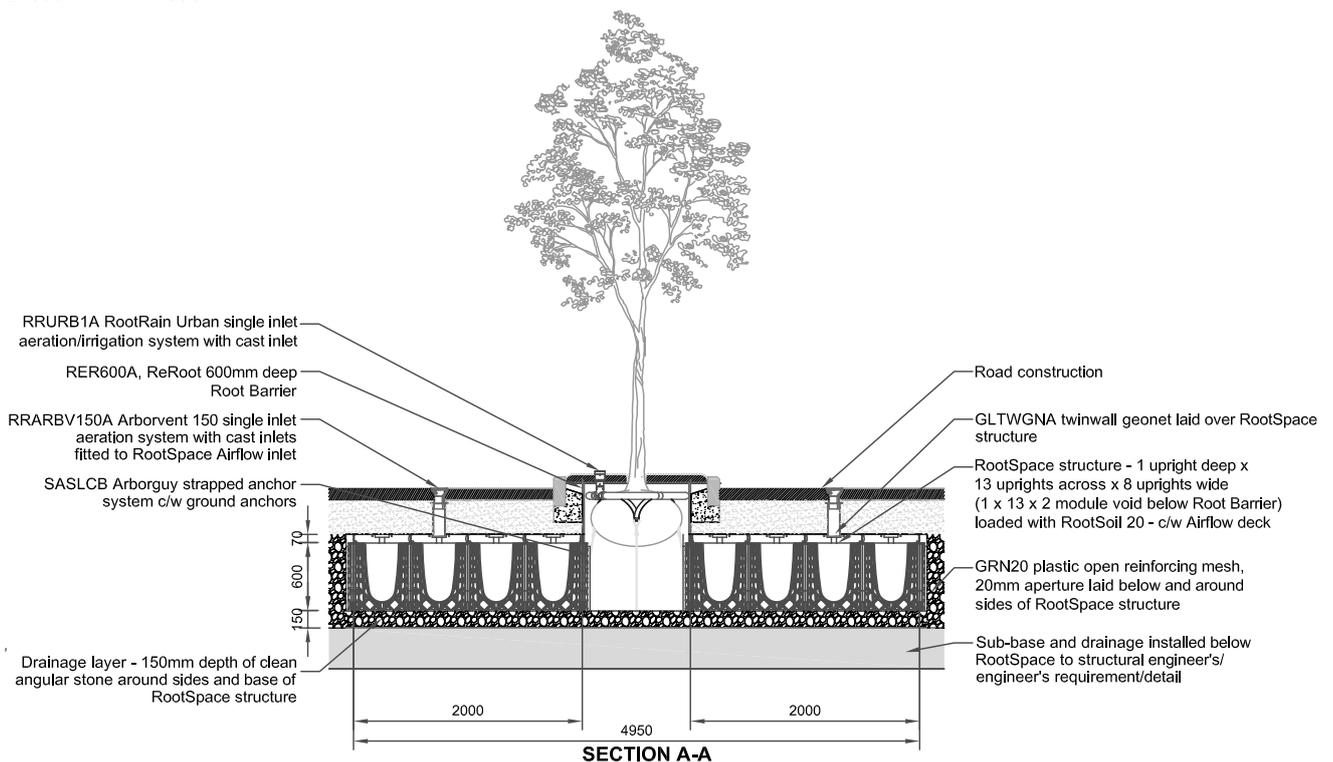
- GBURAC600A RootSpace uprights - 238 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6") per tree
- GBURAC500A RootSpace Airflow deck - 208 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- Rootsoil 20 to fill RootSpace and Root Barrier spaces (including root ball volume) - allow 15.6 cu. m (550.9 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRURB1A RootRain Urban single inlet aeration/irrigation system with cast inlet
- RRARBV150A Arborvent 150 Single inlet aeration system with cast inlets including 0.75m (2.5ft) 100mm (3.9") diameter pipe
- RER600A - ReRoot 600 barrier
- RERJTA - ReRoot Jointing tape
- GLTWGNA twinwall geonet- 26 sq. m (279.9 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 47 sq. m (505.9 sq. ft)
- SASLCB Arborguy strapped anchor system - large

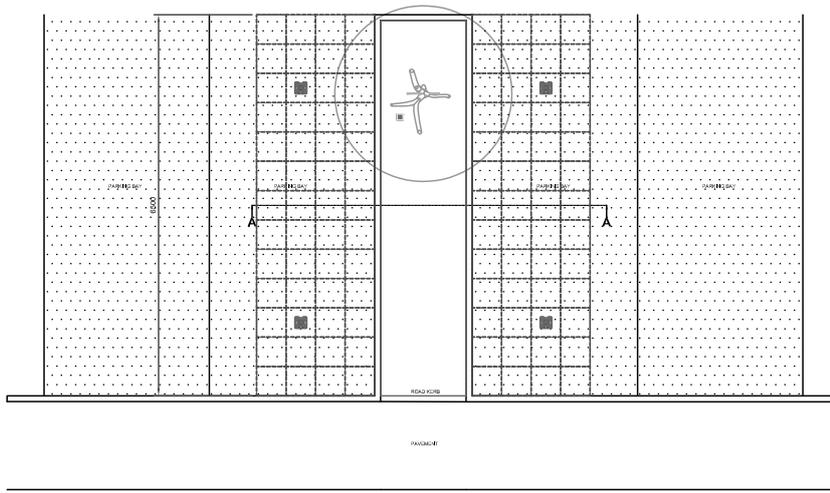
Note: Special drive rod kit required for SASLCB installation

20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

For heavy load applications, install RootSpace side panels to installation as directed by engineer

Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter





GBU2113

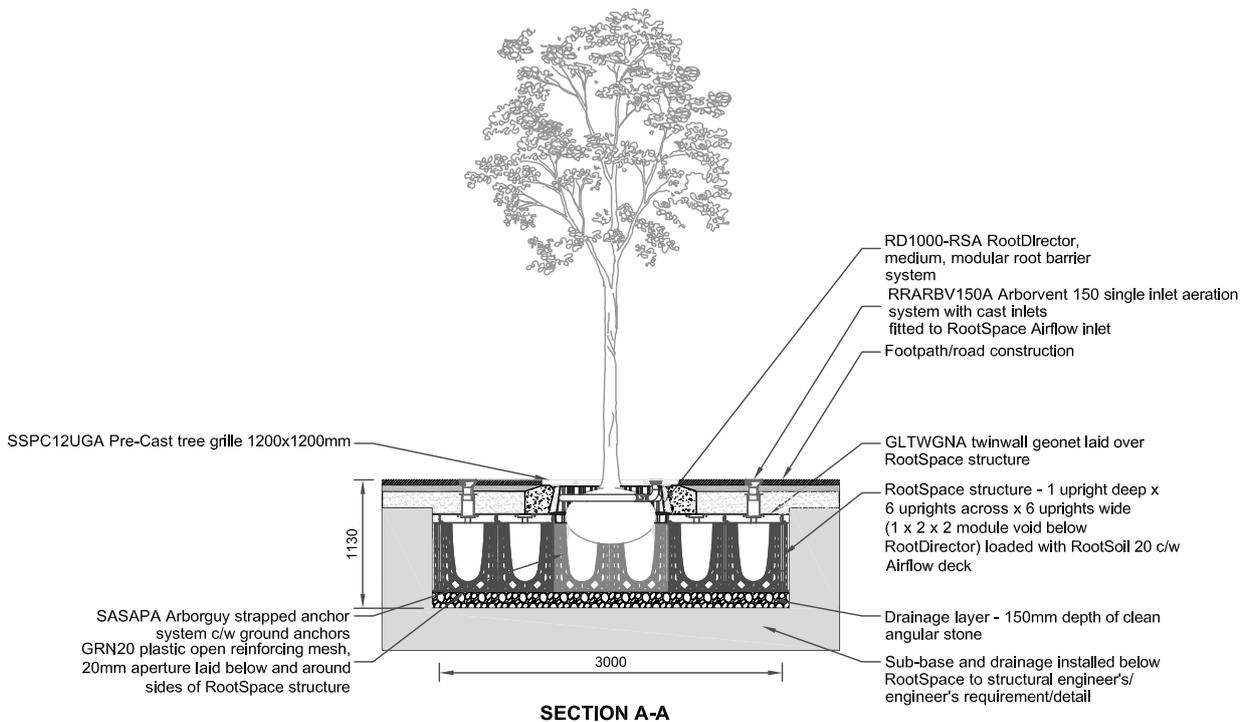
Small species standard car park detail

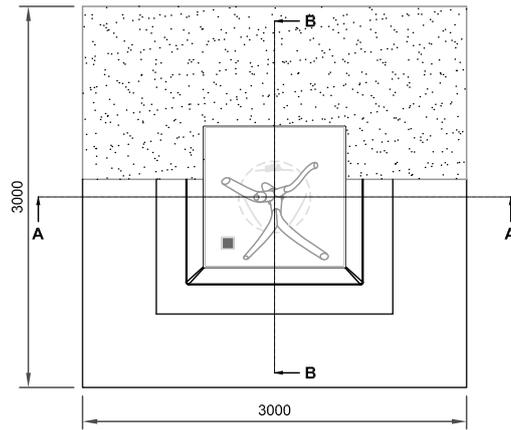
Package includes:

- GBURAC600A RootSpace uprights - 80 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6") per tree
- GBURACSO0A RootSpace Airflow deck - 32 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- Rootsoil 20 to fill RootSpace and RootDirector spaces (including root ball volume) - allow 5.4 cu. m (190.7 cu. ft) per tree. Additional allowance needs to be made for settlement.
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree.
- SSPC12UGA - Pre cast 1200mm (47.2") x 1200mm (47.2") tree grille finished in Granite Blocks, with galvanised steel support frame.
- RRARBV150A Arborvent 150mm (5.9") inlet aeration system with cast inlets
- RD1000-RSA RootSpace RootDirector - medium
- GL TWGNA twinwall geonet - 9 sq. m (96.9 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 21 sq. m (226 sq. ft)

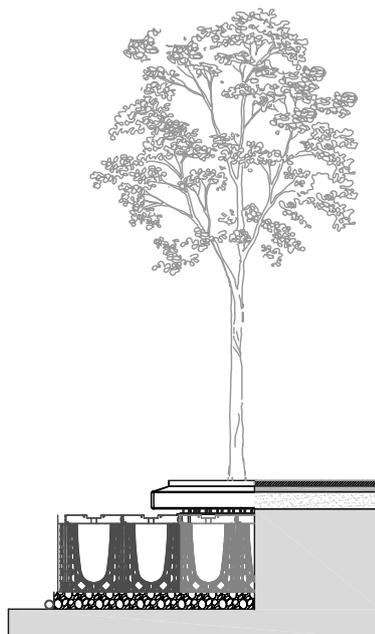
Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter





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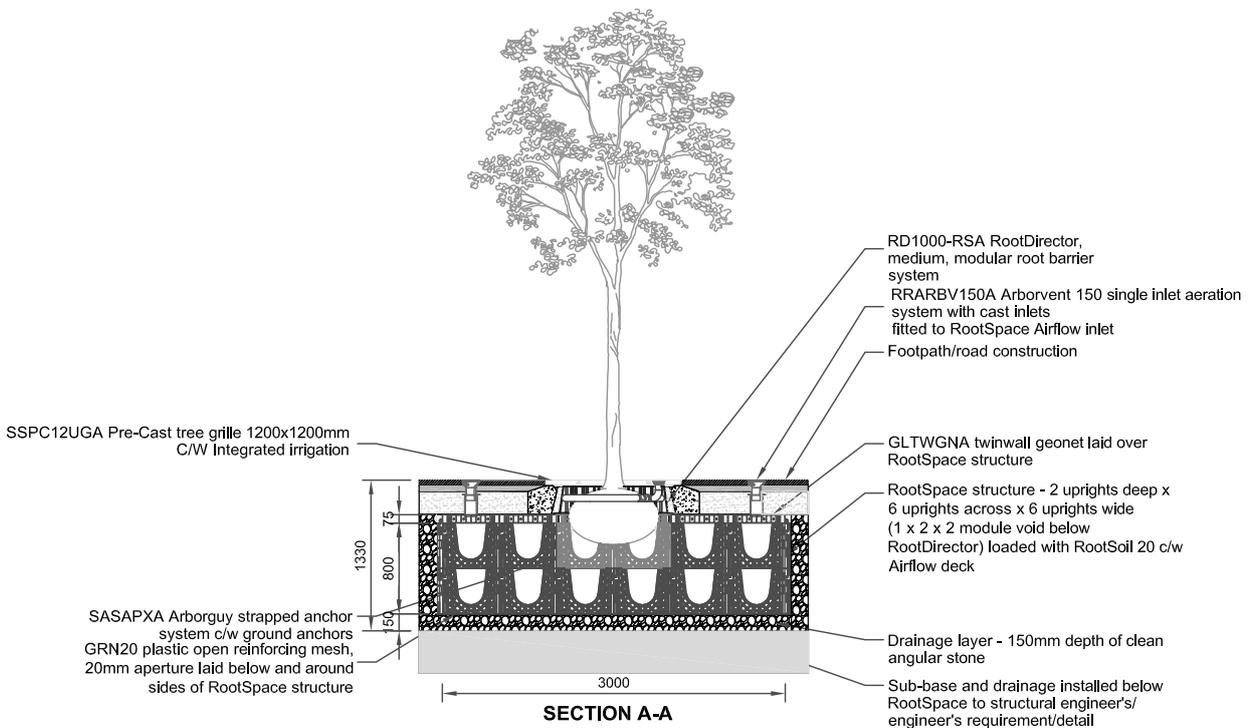
GBU2114

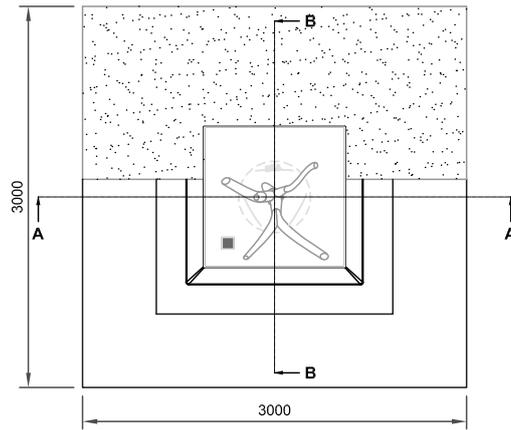
Medium species car park detail

Package includes:

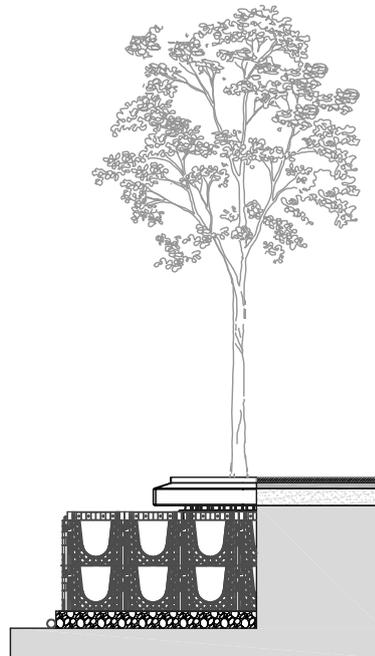
- GBURAC400A RootSpace uprights - 164 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6") per tree
- GBURACS00B RootSpace Airflow deck - 32 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- Rootsoil 20 & RootSoilSUBA to fill RootSpace and RootDirector spaces (including root ball volume) - allow 7.2 cu. m (254.3 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- SPPC12UGA - Pre cast 1200mm (47.2") x 1200mm (47.2") tree grille finished in Granite Blocks, with galvanised steel support frame.
- RRARBV150B Arborvent 150mm (5.9") inlet aeration system with cast inlets
- RD1000-RSA RootSpace Rootdirector - medium
- GL TWGNA twinwall geonet - 9 sq. m (96.9 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 21 sq. m (226 sq. ft)
- SASAPA Arborguy strapped anchor system - large

Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements





PLAN WITH CANOPY HIDDEN



SECTION B-B



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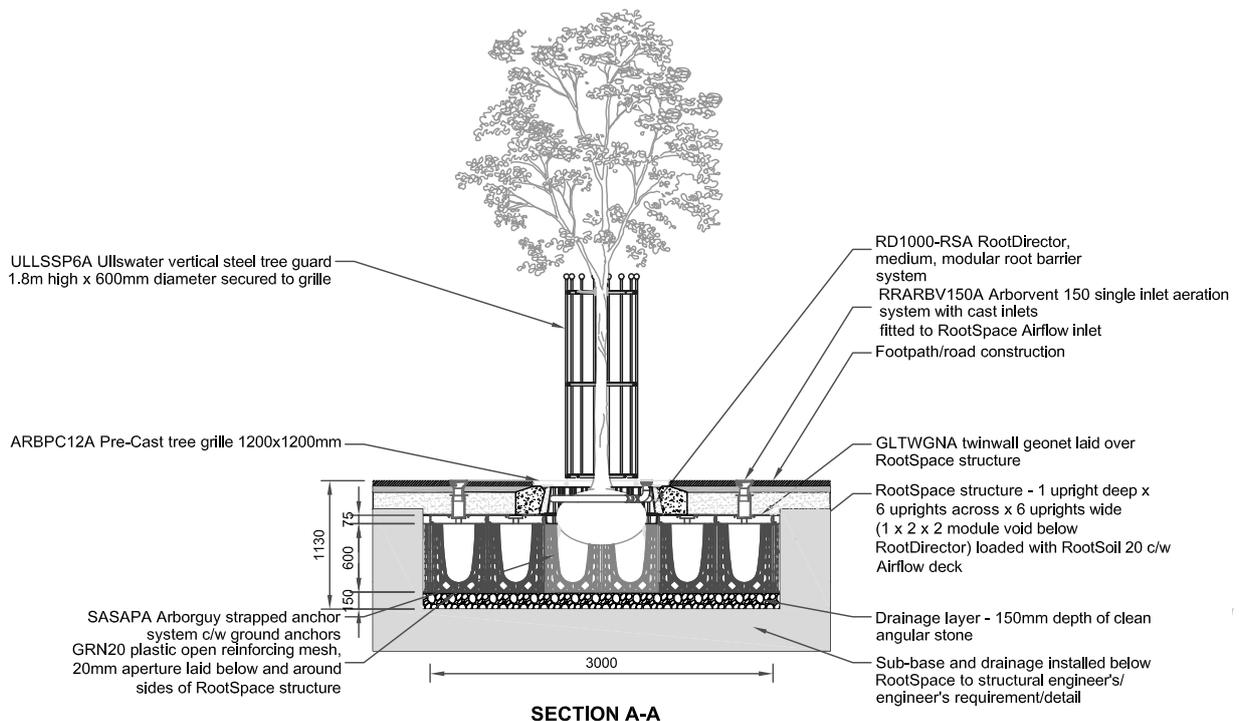
Small species car park detail with vertical guard

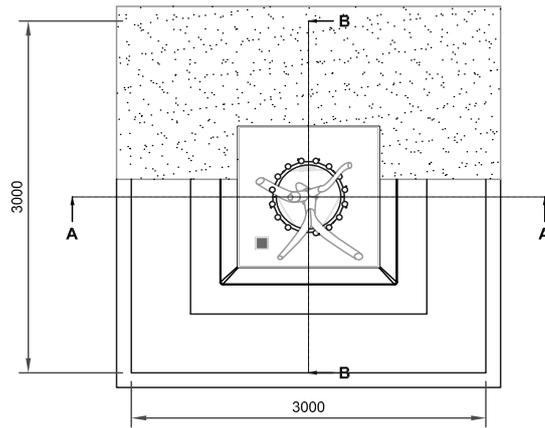
Package includes:

- GBURAC600A RootSpace uprights - 80 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6") per tree
- GBURACS00A RootSpace Airflow deck - 32 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- Rootsoil 20 to fill RootSpace and RootDirector spaces (including root ball volume) - allow 6 cu. m (211.9 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- ARBPC12A - Pre cast 1200mm (47.2") x 1200mm (47.2") tree grille finished in Brittany Bronze ArboResin, with galvanised steel support frame
- RRARBV150A Arborvent 150mm (5.9") inlet aeration system with cast inlets
- RD1000-RSA RootSpace RootDirector - medium
- GL TWGNA twinwall geonet - 9 sq. m (96.9 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 21 sq. m (226 sq. ft)
- SASAPA Arborguy strapped anchor system - large
- ULLSSP6A Ullswater vertical steel tree guard with round angle-section rings, 16mm (0.6") round bars topped with 50mm (2") diameter ball finials, finished in black

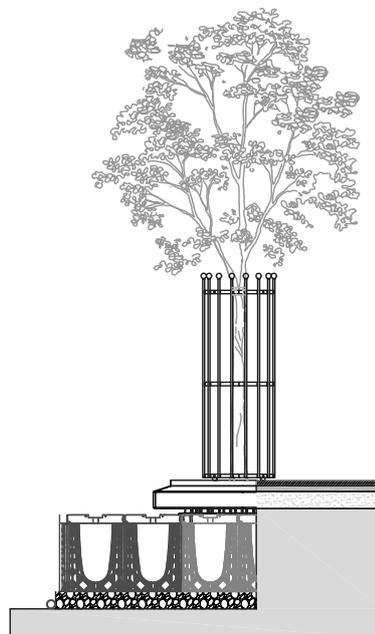
Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter





PLAN WITH CANOPY HIDDEN



SECTION B-B



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GBU2116

Tree in soft with additional rooting volume

Package includes:

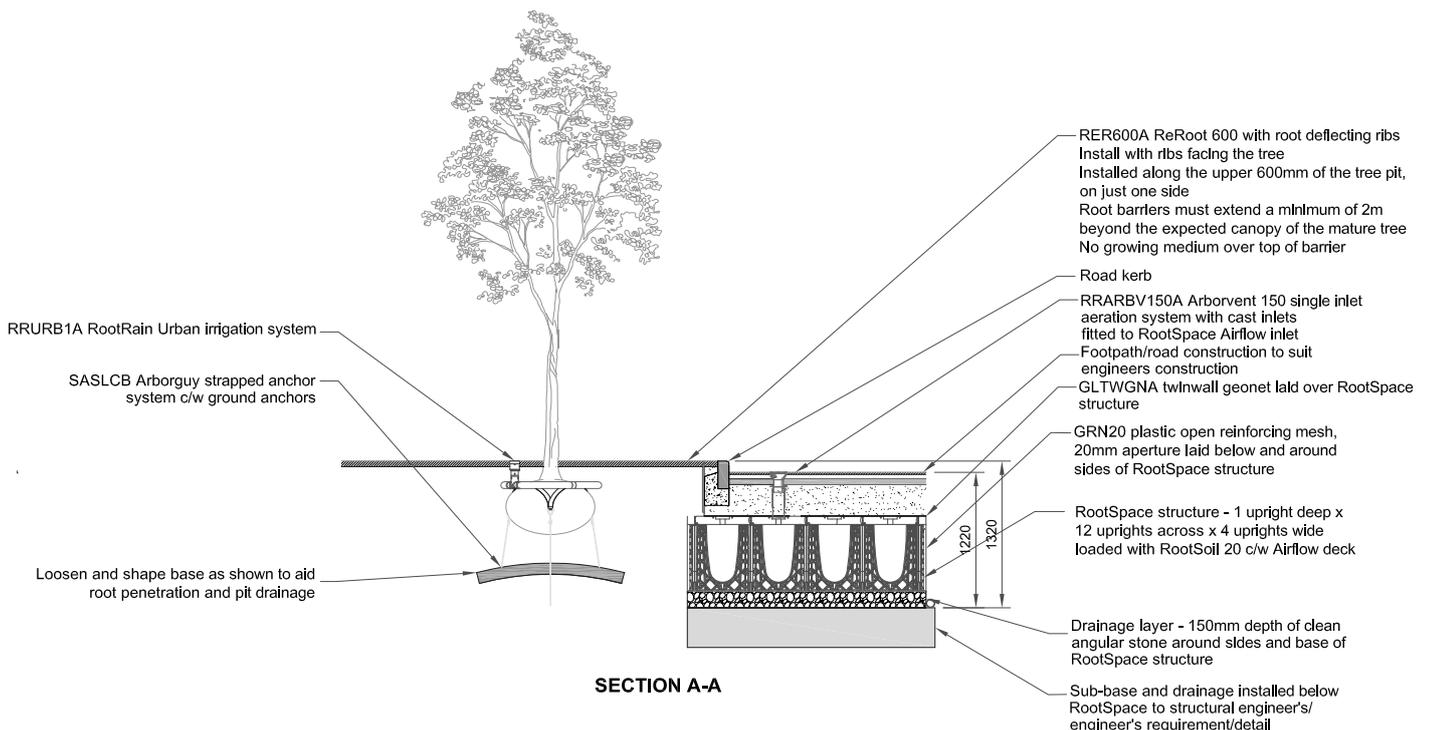
- GBURAC600A RootSpace uprights - 112 No. 500mm (19.7") x 70mm (2.8") x 600mm per tree
- GBURAC500A RootSpace Airflow deck - 48 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- Rootsoil 20 to fill RootSpace - allow 7.2 cu. m (254.3 cu. ft) per tree in hard paving. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRARBV150A Arborvent 150 single inlet aeration system with cast inlets including 0.75m (2.5ft) 100mm (3.9") diameter pipe
- GLTWGNA twinwall geonet - 12 sq. m (129.2 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 22 sq. m (236.8 sq. ft)
- SASLCB ArborGuy strapped anchor system - large
- RRURB1A RootRain Urban irrigation system
- RER600A ReRoot 600 ribbed root barrier
- RERJT A Re Root Jointing tape

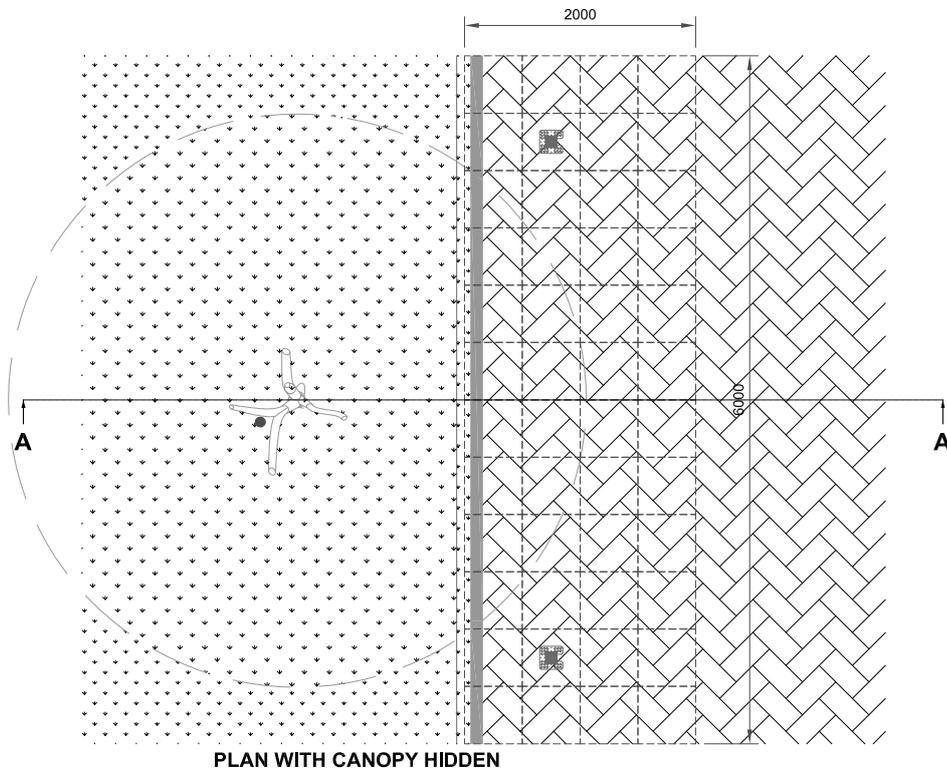
Note: Special drive rod kit required for SASLCB installation

20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

For heavy load applications, install RootSpace side panels to installation as directed by engineer

Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter





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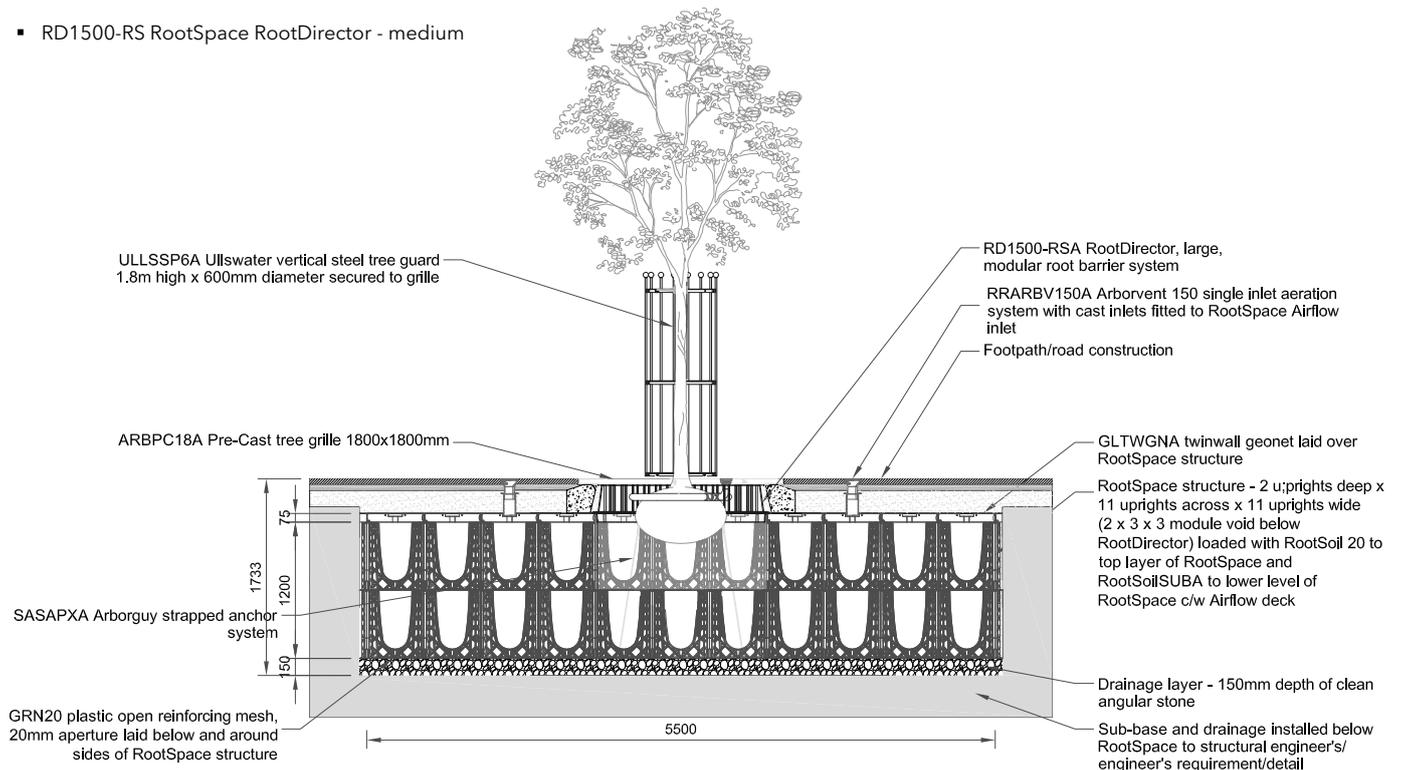
Large species car park detail

Package includes:

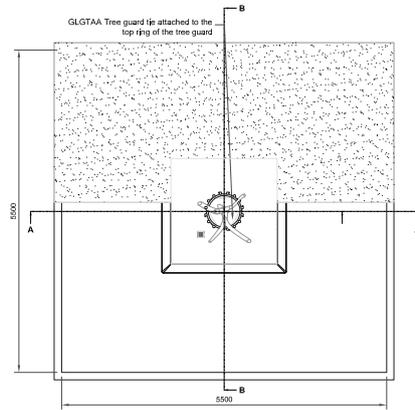
- GBURAC600A RootSpace uprights - 516 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6") per tree
- GBURAC500A RootSpace Airflow deck - 112 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- Rootsoil 20 to fill upper RootSpace level and RootSoil SUBA to fill lower level of RootSpace and RootDirector spaces (including root ball volume) - allow 38.3 total cu. m (254.3 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- ARBPC18A - Pre cast 1800mm (70.8") x 1800mm (70.8") tree grille finished in Brittany Bronze ArboResin, with galvanised steel support frame & integrated irrigation.
- RRARBV150A Arborvent 150mm (5.9") inlet aeration system with cast inlets
- RD1500-RS RootSpace RootDirector - medium
- GL TWGNA twinwall geonet - 30.25 sq. m (325.6 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm aperture - 52.25 sq. m (562.4 sq. ft)
- SASAPXA Arborguy strapped deadman anchor system - large
- ULLSSP6A Ullswater vertical steel tree guard with round angle-section rings, 16mm (0.6") round bars topped with 50mm (2") diameter ball finials, finished in black

Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

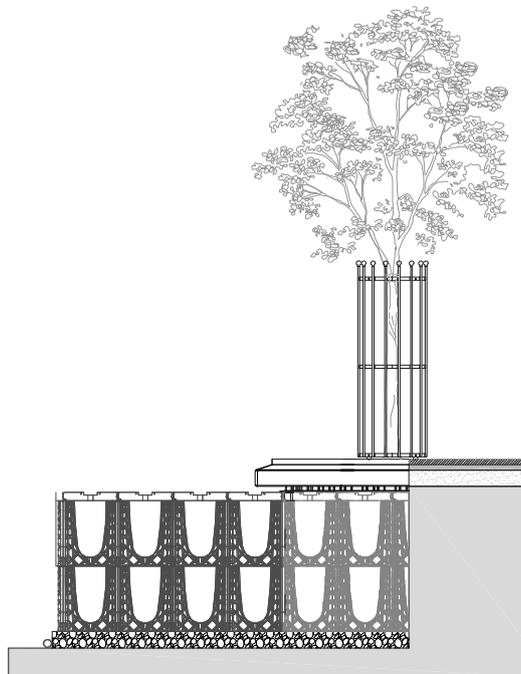
Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter



SECTION A-A



PLAN WITH CANOPY HIDDEN
SCALE 1:100



SECTION B-B



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GBU2118

SuDS / LID permeable paved landscape strip detail

Package includes:

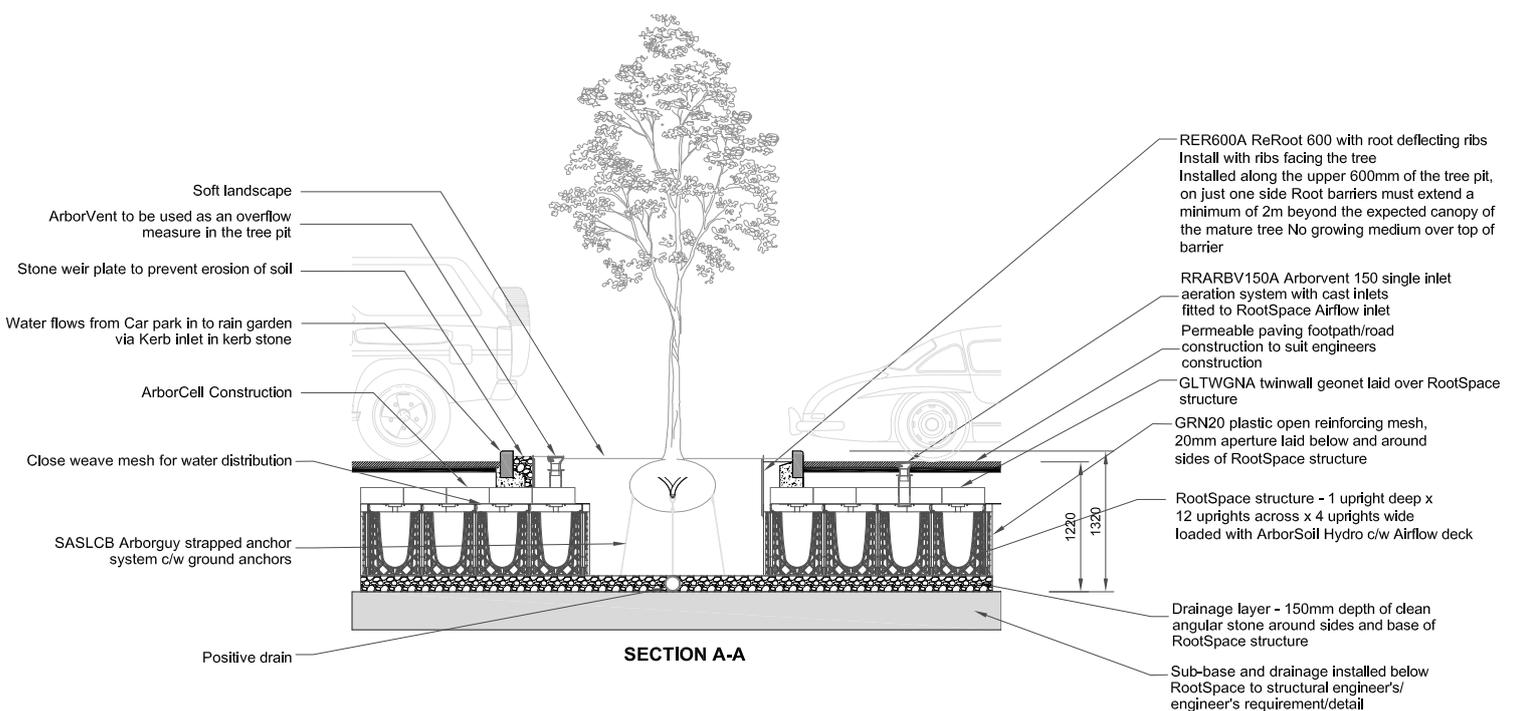
- GBURAC600A RootSpace uprights - 112 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6") per tree
- GBURAC500A RootSpace Airflow deck - 48 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- ArborSoil Hydro to fill RootSpace - allow 14.4 cu. m (508.5 cu. ft) per tree in hard paving. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRARBV150A Arborvent 150 single inlet aeration system with cast inlets including 0.75m (2.5ft) 100mm (3.9") diameter pipe
- GL TWGNA twinwall geonet - 24 sq. m (258.3 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 44 sq.m (473.6 sq. ft)
- SASLCB ArborGuy strapped anchor system - large
- RRURB1A RootRain Urban irrigation system
- RER600A ReRoot 600 ribbed root barrier
- RERJT A ReRoot Jointing tape
- ArborCell drainage board
- close weave mesh - 24 sq. m (258.3 sq. ft)

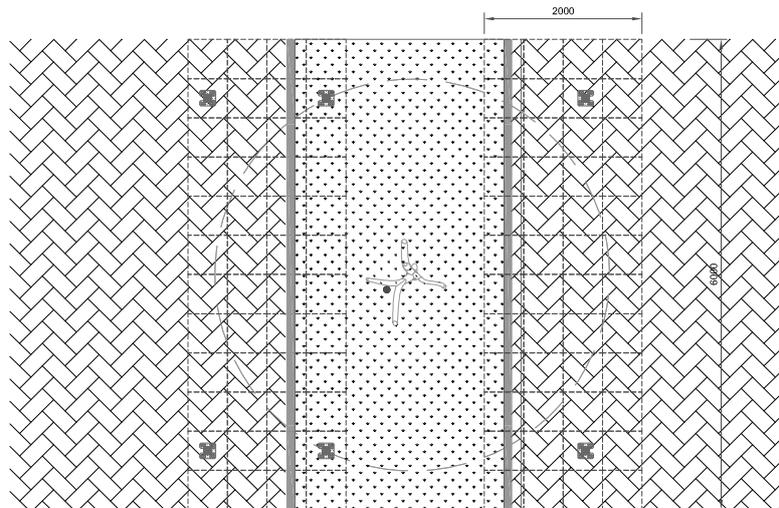
Note: Special drive rod kit required for SASLCB installation

20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

For heavy load applications, install RootSpace side panels to installation as directed by engineer

Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter. Additional build up may be required for heavier vehicular loading purposes.





**PLAN WITH CANOPY HIDDEN
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GBU2119

SuDS build out tree pit (small tree species)

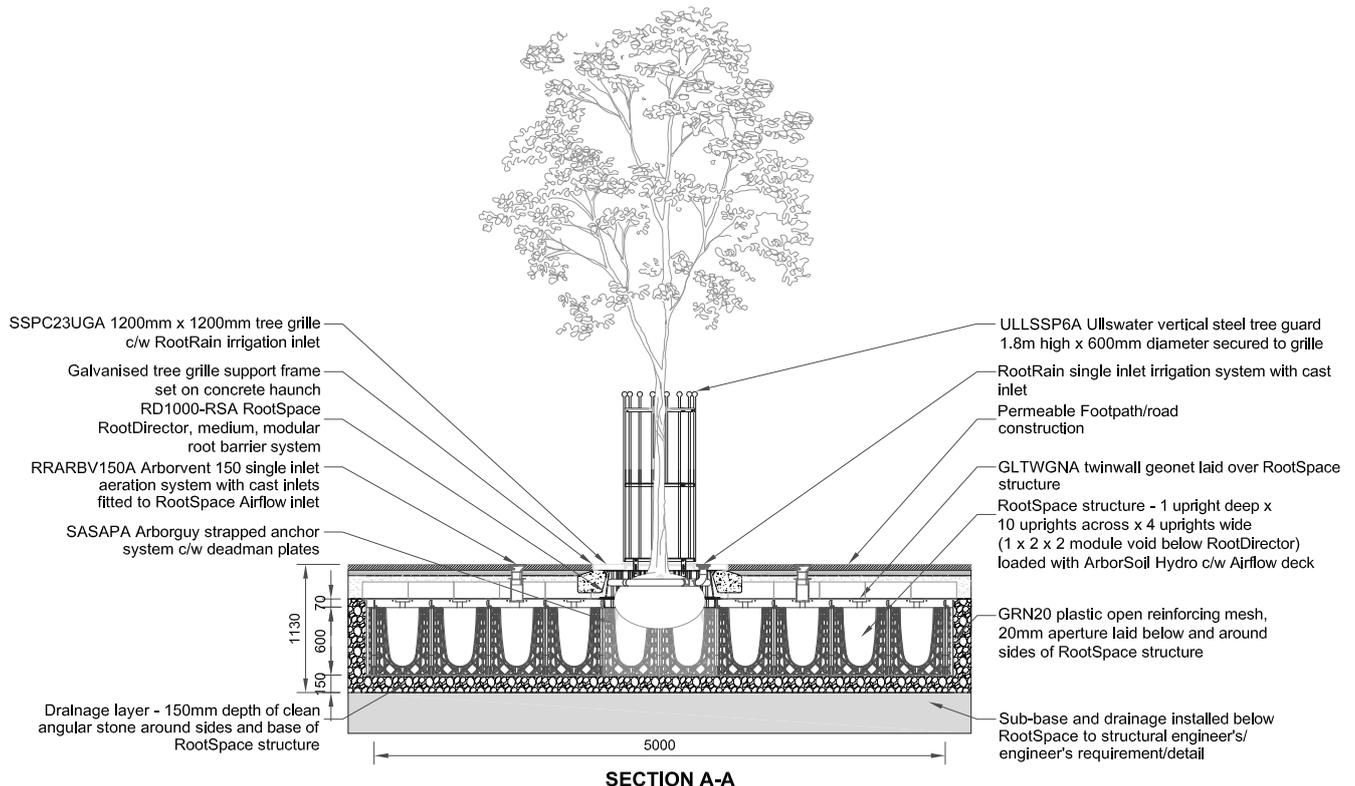
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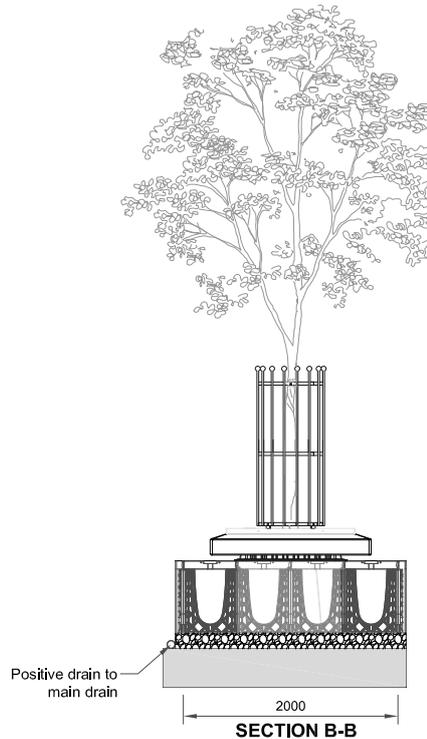
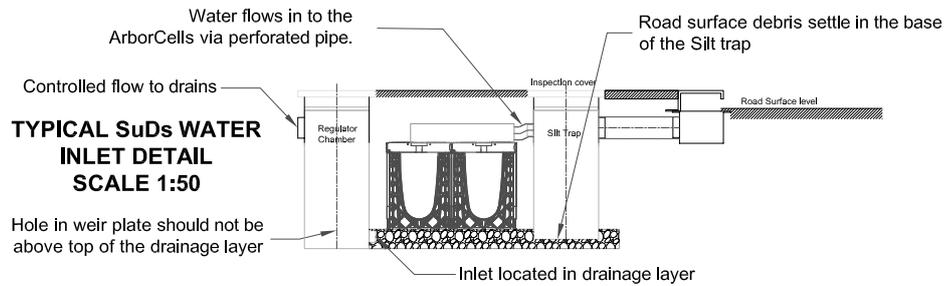
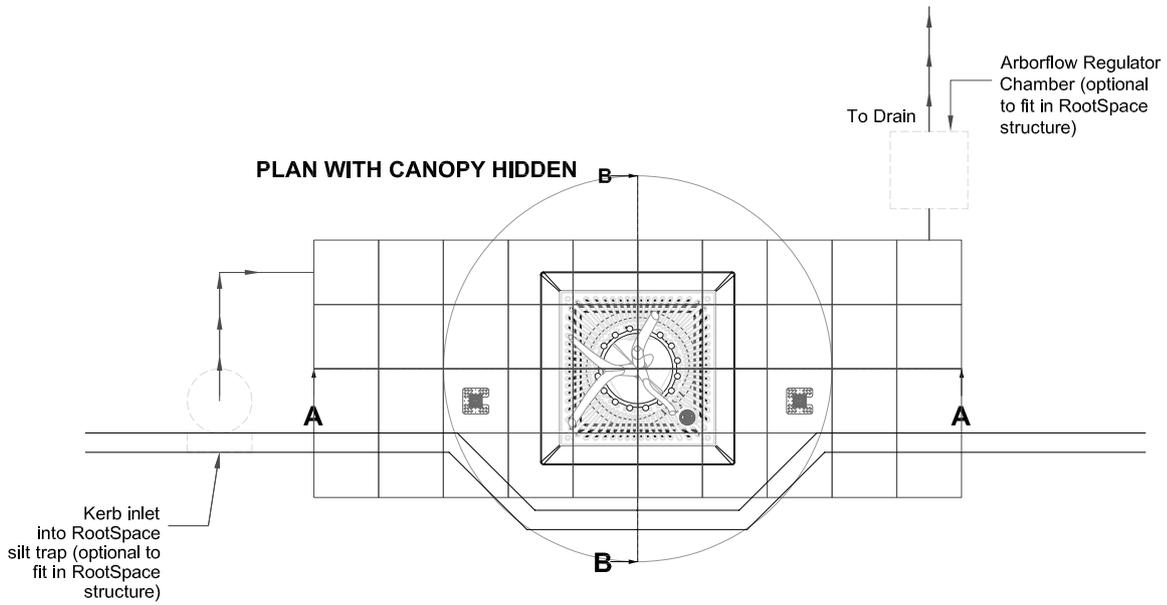
- GBURAC600A RootSpace uprights - 90 No. 500mm (19.7") x 70mm (2.8") x 600mm (23.6") per tree
- GBURAC500A RootSpace Airflow deck - 36 No. 500mm (19.7") x 500mm (19.7") x 70mm (2.8")
- ArborSoil Hydro to fill RootSpace and RootDirector spaces (including root ball volume) - allow 6 cu. m (211.8 cu. ft) per tree. Additional allowance needs to be made for settlement
- RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g (0.4 lbs) per tree
- RRARBV150A Arborvent 150 single inlet aeration system with cast inlets including 0.75m (2.5ft) 100mm (3.9") diameter pipe
- RD1000-RSA RootSpace RootDirector - medium
- GL TWGNA twinwall geonet - 10 sq. m (107.6 sq. ft)
- GRN20 plastic open reinforcing mesh, 20mm (0.8") aperture - 24 sq. m (258.3 sq. ft)
- SASAPA Arborguy strapped anchor system - large
- ULLSSP6A Ullswater vertical steel tree guard with round angle-section rings, 16mm (0.6") round bars topped with 50mm (2") diameter ball finials, finished in black
- SSPC12UGA Settstone 1200mm (47.2") x 1200mm (47.2") tree grille, finished in block granite, with galvanised steel support frame
- ArborCells drainage board for water storage
- Close weave mesh for water distribution
- Kerb Inlet
- Silt trap and ArborFlow Regulating Chamber

Note: 20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

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Structural engineer's note: For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter





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4

The presence of large species trees **positively** influences shoppers perceptions and behaviours.

BBC Television Centre, White City, London

Project Support and Advisory Service

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Specification Support Service

Support from start to finish

GreenBlue Urban offer an easy to access support service, tailored to provide the back up and assurance specifiers need. We appreciate that many of today's building projects can be very involved and complex; involving many fields of expertise of which the actual tree planting may be just a part.

Many professionals involved in tree planting benefit from our easy to use CAD series of **ArborSystem** tree pits, thus saving themselves many hours of design time and at the same time giving peace of mind that the key features of successful tree pit design have been covered.

Alternatively, you can email (UK: enquiries@greenblueurban.com, NA: inquiries@greenblue.com) your own tree pit detail through to our team of specialists for a detailed appraisal. We can then advise you, without obligation to purchase, on what we feel the best option is for you, or of potential opportunities on your drawing for improving the trees' long term chances of thriving.

NBS Plus

Easy Specification

GreenBlue Urban are included on the NBS and NBS Plus service database. This service delivers expert solutions to the construction industry through innovative specification products and information resources.

It is invaluable for those landscape and building professionals who subscribe, who can access a wide range of specification clauses and details for the wording of contract documents and bills of quantities.

NBS Plus is a library of manufacturers product information integrated into the NBS software suite (NBS Building, Engineering Services and Landscape) that places manufacturer's information in front of specifiers when they most need it – at the specification stage. Now at the click of a mouse using the proprietary specification method, products can easily be brought into a project specification, edited to suit and help create a complete and concise specification.

GreenBlue Urban have invested a lot of time into the details available for subscribers to ensure that the detail is relevant, helpful and accurate.

The NBS service covers the complete range:

- Root management
- Tree pit irrigation
- Soil cells
- Grilles and guards
- Tree anchoring
- Complete ArborSystem packages



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GreenBlue Urban Training Centre

Hands on Training at GBU Headquarters

At our new premises in East Sussex, we can now offer a condensed half day training workshop for small groups, on urban tree pit theory and practice. Typical workshop session includes:

- Welcome and refreshment
- Meet the the **GreenBlue Urban** team
- Tour of the facility including tree planting around the building
- PowerPoint presentation on Urban Tree Pit Design, drawing on extensive project case studies
- Focus on root management and root morphology
- SuDS / LID tree pit design
- Question and answer session
- Comfort Break
- Build a tree pit - hands on with the products to see how they fit together - even construct the tree pit you have in mind for your project

Close of session and buffet lunch provided.

Workshop content can be tailored to suit specific group requirements - please contact our admin team to book a session for your company or local authority.



CPD Service

Keep your team up to date with current best practice tree pit design

GreenBlue Urban offer a tree pit design workshop CPD to give specifiers and local authorities a condensed overview of the principles and products available to them when designing for canopy volume trees in urban space.

The CPD explores tree root morphology, root management techniques, load bearing soil structure options and tree pit design in conjunction with water sensitive urban drainage (WSUDS).

Case studies and planning law are discussed, and time is given for attendees to ask questions or get advice on their specific tree planting challenges.

The feedback has consistently been extremely positive. The main comments being how well informed they now feel as to what is possible when planting trees on challenging sites and how they feel more confident recommending such technologies and solutions to clients, in order to see trees more successfully established in the long term.



Register online at [greenblue.com](https://www.greenblue.com) or email to book your CPD today.

UK Requests: enquiries@greenblueurban.com

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Pan Am Center, Markham, Ontario

ArborSystem Approved Contractors Scheme

An introduction to the aims and intentions of the GreenBlue Urban ArborSystem Approved Contractor Scheme

Background

This scheme was set up in response to many requests from landscape architects for a recommended contractor who they can be confident will install **GreenBlue Urban** products to the highest possible standards of workmanship and integrity.

We initially chose a small number of well established landscape contractors who have had a long-standing working relationship with **GreenBlue Urban**, because we felt this was the safest way to manage the preliminary list.

Using this preliminary list, a series of introductory seminars were arranged to introduce the scheme to the landscape contracting firm's managements and these were very well received indeed. The next stage was to evaluate the contractor's performance in the field, commencing a long term ongoing site inspection regime at periodic intervals to ensure that these standards are maintained.



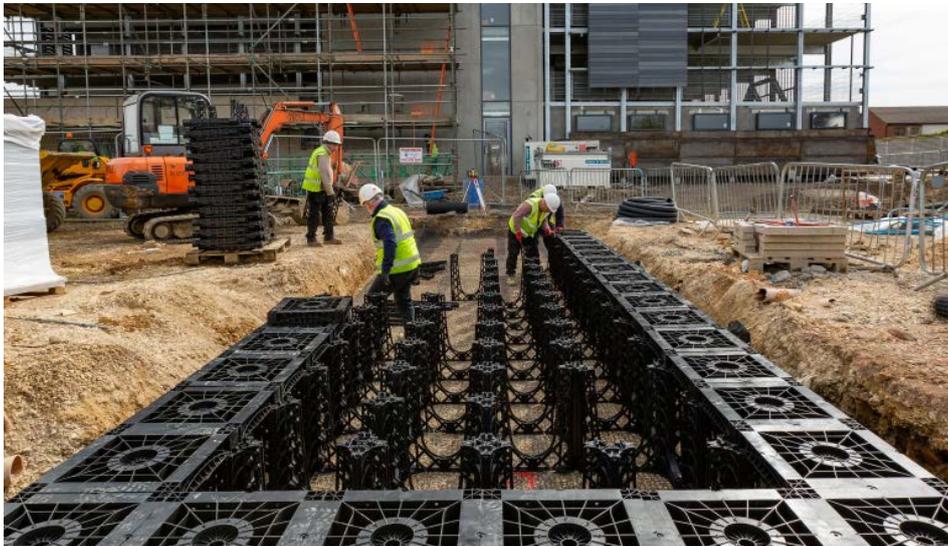
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ArborSystem Approved Contractors Scheme

An introduction to the aims and intentions of the GreenBlue Urban ArborSystem Approved Contractor Scheme



Knowledgeable installers leads to quality installations

To be successful, the landscape contractor will undergo a training course (on their own premises) by [GreenBlue Urban](#). At the same time, the contractors commitment and attitude to all aspects of tree planting is carefully evaluated. Following this training session, the next **ArborSystem** installation undertaken by the contractor is carefully inspected. Special attention is given to detailed on-site workmanship.

Assuming the company passes these examinations, they will then, and only then, be included on an exclusive list of **GreenBlue Urban ArborSystem** Approved Contractors. This list and indeed the whole concept will be included in our future marketing plan to prove our ongoing commitment to tree planting systems and installations of the highest standards

Review Procedures

To remain on the **ArborSystem** Approved register, landscaping firms will need to demonstrate the following:

1. Continual high standards of workmanship on site
2. Complete integrity when working to architects specifications
3. Compliance with all architects site instructions
4. Detailed reporting procedure for onsite issues that may arise
5. A good commitment to continuous improvement
6. Financial integrity

All contractors will be expected to co-operate fully with **GreenBlue Urban ArborSystem** review procedures which will be carried out on a routine annual basis, but will also be considered every time a project requires a list to be issued. Any contractor refusing to cooperate with **GreenBlue Urban** site inspectors will be removed from the **GreenBlue Urban ArborSystem** Approved Contractor Scheme.



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ArborSystem Configurator

Design and configure your own tree pit system to your exact needs

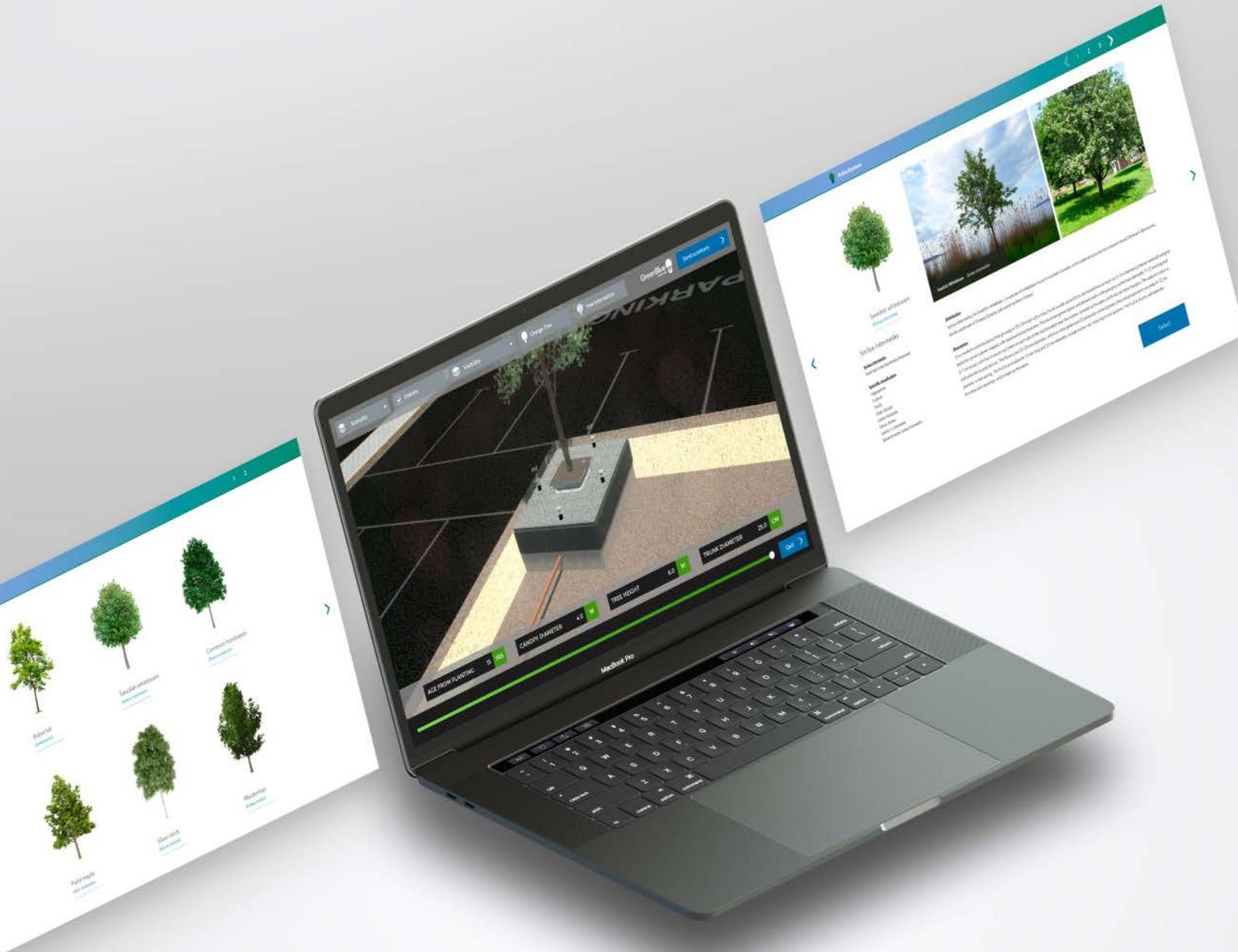
GreenBlue Urban are delighted to announce the launch of their **FREE** online tool that enables users to design a tree pit to their exact requirements.

It has been a long-term ambition of **GreenBlue Urban's** to make it easier for clients to specify products and design a tree pit with ease.

The new tool hosts a wide selection of tree species to compliment designs with a range of infrastructure scenarios. Incorporating **ArborFlow** ensures **SUDS / LID** tree pits are also an option for planners and designers.

Full specifications and drawings are distributed for ease of quotation and project estimation.

The main purpose of the configurator tool is to enable the right size tree pit using proven products for optimal tree growth. Thus, underlying the **GreenBlue Urban** mission of enabling sustainable cities through green and blue infrastructure.



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5



New Burlington Place, London, UK

Tree Species Selection

- Acacia Aneura
- Accolade Elm (Ulmus Morton)
- Acer Freemanii
- Acer lobelli
- Acer platanoides Globosum
- Alnus spaethii
- Amelanchier lamarckii
- Carpinus betulus Fastigiata
- Catalpa bignonioides
- Celtis OccidentalisCorylus colurna
- Corylus colurna
- Crataegus momogyna
- Ginkgo biloba
- Gleditsia triacanthos
- Heritage River Birch (Betula Nigra)
- Liquidambar styraciflua
- Liriodendron tulipifera
- Magnolia grandiflora
- Metasequoia glyptostroboides
- Paulownia tomentosa
- Pinus Nigra
- Platanus hispanica
- Prunus Kanzan
- Pyrus calleryana Chanticleer
- Quercus Ilex
- Quercus palustris
- Sorbus aucuparia
- Tilia Cordata
- Tilia henryana
- Washingtonia robusta

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Tree Species List

For over 25 years, **GreenBlue Urban** has been closely involved with planting urban trees. Ongoing research and development has provided increasingly effective methodologies and products to suit, facilitating trees to achieve their species potential.

It is critical that we continue to enable trees in our urban areas to reach maturity; it is not until trees get to a decent size that they provide the huge benefits that humanity depends on for sustainability. Many ancient cities and civilisations ended up vacating their urban conurbations due to them becoming no longer habitable; some a lack of water, some by pest and disease, some due to natural disasters such as earthquakes, some by war and some by increasingly difficult climatic conditions.

Currently, it is said that the world stands at a crossroads. Scientists often speak about climate change, and each human on earth has the responsibility to mitigate against possible changes in our weather patterns. Much work is being done to reduce carbon emissions, but every tree planted is a small incremental move towards a more sustainable planet.

GreenBlue Urban has consistently enabled cities to plant trees guaranteed to reach maturity. Our culture encourages having a wide palette of tree species, as this is the best protection from pest and disease wiping out a particular species or clone. Many less common trees have flourished in **GreenBlue Urban ArborSystems**, and we set ourselves, by recreating the below ground conditions that these trees have evolved to establish in, to enable any tree species to be grown in urban locations.

That said, in our experience, some species are more tolerant of the particularly hostile conditions experienced in our towns and cities. Some trees thrive in areas of high heat reflectivity, whilst others struggle with road salt. Please contact our technical department or download the **TDAG Tree Species Selection Guide** for more information.

On the next few pages we are pleased to share a selection of some of the many tree species that have thrived in **GreenBlue Urban** projects. Please send us your photographs of your projects with **GreenBlue Urban** products for us to include in future editions!

Location: East Hatcher Road, Phoenix, Arizona

Species: Acacia Aneura

Sunnyslope, a suburb of the city of Phoenix, was originally settled by persons who needed a dry warm climate to recuperate from tuberculosis and other respiratory diseases. The first proper houses were built around the time of the first world war, but the area north of the Arizona Canal was exceptionally dry. In fact, there are only 22 days of rainfall on average in the whole year. Average summer temperatures are about 40°, and so unsurprisingly, when these Mulga [Acacia aneura] trees were chosen, drought tolerance was the prime reason. In their native Australian outback, these nitrogen fixing trees enable them to grow in poor soils. These trees will never be large, so are suited to narrow sidewalk installations.



Location: Union Station, Toronto, Ontario

Species: Accolade Elm (Ulmus Morton)

The main station serving Toronto's central business district has been rebuilt a number of times since the original opening in 1858. The current building dates from 1927, and now serves over 250,000 passengers every day. The surrounding streets have been gradually upgraded, and in 2011, West Front Street, outside the station, was repaved, and a number of Accolade Elm [Ulmus Morton] trees were planted. These Dutch Elm resistant trees have shown themselves to be also resistant against various pests and diseases, and do well in a wide variety of soils, except those waterlogged. It is noticeably cold hardy having been tested to temperatures below -30°!



Location: High Street, Lockerbie, Scotland

Species: Acer Freemanii

Lockerbie, a town on the main routes between London and Glasgow, both road and rail, grew around the cross roads and railway station in the centre of the town. Long known for the sheep market held here for centuries, models of sheep stand on the pavement between the Maple [Acer x fremanii Autumn Blaze] trees, reminding passers-by of the history. These trees are a good choice for the autumn colour as they are more reliable than the parent Canadian Maple, and tolerate most soil conditions. The red leaf colour complements the natural red local sandstone that has been used in construction of most of the town buildings.





Location: Commercial Street, Maesteg, Wales

Species: Acer lobelli

This town was established due to good accessible reserves of coal and iron ore in the valley. For years while, Maesteg flourished as an iron producing centre, and exported much of its product overseas. However, the invention of steel destroyed the iron industry, and the town then relied on coal mining. Fortunately, the coal was of the highest quality, and this industry provided much employment locally until the mines closed in the 1980s. In Commercial Street the Lobels Maple [Acer lobelia] tree has been successfully planted, and gives quite an impact without dominating the street scene. This species is a naturally occurring hybrid which is fastigate in character, ideal for tight urban spaces.



Location: Cheapside, Bridgend, Wales

Species: Acer platanoides Globosum

A redevelopment plan for this town, strategically positioned between Cardiff and Swansea, gave opportunity for some tree planting and art exhibition. An unusual copse of Farlakes Green Mophead [Acer platanoides Globosum] has established exceptionally well, breaking up the intense hard landscape in this town centre position. This tree is created "unnaturally", where the canopy is top grafted onto a platanoides stem, to give the architecturally satisfying form. As a tree, it does well in most soil types, is drought resistant and copes with air pollution.



Location: Royal (Dick) School of Veterinary Studies, Easter Bush, Edinburgh

Species: Alnus spaethii

This top veterinary school built an entirely new campus to the south of Edinburgh in 2011 and planted a number of trees in and adjacent to hard surfaces. Abutting the stunning Pentland Hills, it was important to screen the campus, and these unusual Alder [Alnus spaethii] trees have grown well in the hard paving. A rare tree that does well in most environments, it is well adapted to wet soils, and is "nitrogen fixing" allowing establishment in areas of low soil fertility.

Location: New Burlington Place, London

Species: Amelanchier lamarckii

This quiet street, just hidden off Regent Street in Mayfair, was originally the Mews for the grand houses in the parallel New Burlington Street. Now largely redeveloped following devastating bombing during September 1940, the street has been refurbished and new commercial properties have been built. During the refurbishment all of the paving was relaid, and new Serviceberry [*Amelanchier lamarckii*] trees were planted, making a fascinating visual statement in this narrow road. Providing both attractive floral blooms during the spring, and attractive leaf colouring throughout the year, this is an excellent choice for close proximity to buildings and in streets.



Location: Station Road, Ashington, England

Species: Carpinus betulus Fastigiata

Ashington expanded with the coal mining boom. At the peak, it was known as world's largest coal-mining village, but as coal mining declined, so did the town. Unusually, although the town has a railway line running through it, and a Station Road, there are no passenger trains serving it! During 2014, Station Road was reconfigured, providing for trees and parking, and in particular for the weekly market stalls. The avenue of Hornbeam [*Carpinus betulus fastigiata*] trees gives a softening effect to a built-up area, and in the summer furnishes needed shade. This species thrives in poor soil conditions and tolerates compaction.



Location: Jubilee Square, Leicester

Species: Catalpa bignonioides

In 2012, Queen Elizabeth II visited Leicester, and as it was her Golden Jubilee year, this new public open space was named after this event. During construction it became clear that this site had been in use for over 2000 years, as Roman remains were excavated, and signs of the Fosse Way were discovered. Different tree species were planted, some in soft areas, and some in hard paving, all working together to make this space pleasant. This Indian Bean [*Catalpa bignonioides*] tree is unusual in that this species does not normally thrive in hard surfaces but is a great choice for other urban areas.





Location: Massachusetts Avenue, Boston, Massachusetts
Species: *Celtis Occidentalis*

This major thoroughfare, in total 16 miles long, bisects the city of Boston. A largely commercial street, almost every type of business can be found along it, and in central urban areas it is very busy with pedestrians. City council agencies invested substantial funds to improve some of the sections of this road and planted these Hackberry [*Celtis occidentalis*] trees in the sidewalk, offering shade and storm water attenuation from its vigorously growing canopy. Very suited to urban planting but not often planted, the berries from this species are consumed by birds and small mammals. The closely related Nettle Tree (*Celtis australis*) is commonly planted as an urban tree in Europe.



Location: Commercial Way, Woking
Species: *Corylus colurna*

This popular commuter town was laid out during the late part of the 19th Century. Commercial Way, at the centre of the town was arranged as a street of shops and has remained almost exactly as originally designed. The road was pedestrianised during the 1970s, and lined with trees, which by 2010 were causing significant paving issues with root heave. During 2013, the shopping centre was refurbished, and Commercial Way re-paved, and new trees were planted, including these Turkish Hazel [*Corylus colurna*] trees, providing a peaceful attractive area in which to shop. This splendid tree thrives in all soils, tolerates hard paved areas and is not susceptible to disease.



Location: Guide Bridge, Ashton-under-Lyne
Species: *Crataegus momogyna*

Ashton-under-Lyne prospered during and after the Industrial Revolution, being a mill town at the junction of canals and railways. Although there were coal mines nearby, textile manufacturing was the main employment, and much of the housing was provided to accommodate the workers for the mills. To complement some of the new housing, a wide variety of street trees were planted, including this Common Hawthorn or May [*Crataegus monogyna*] tree, which provides visual interest, and traffic calming in this residential street. This species is ideally suited to urban areas, as it retains a medium canopy, tolerates both wet and dry soils and air pollution.

Location: Chapel Court, St Catherine's College, Cambridge UK

Species: Ginkgo biloba

St. Catherine's college in Cambridge was first founded in 1473 and remained a small college until the original buildings were rebuilt in the 17th Century. The Chapel was completed in 1704, and the college has continued to thrive since then. In 2013 a new building, the McGrath Centre, was completed to provide a new theatre area and other facilities, and an adjacent courtyard, Chapel Court, was reconstructed, providing a restful sanctuary for students. This restricted space has had two Maidenhair Tree [Ginkgo biloba] specimens planted, which will provide multiple benefits for generations to come. This fascinating species is a relic of prehistoric times, and copes well with reflected heat and traffic pollution.



Location: Havelock Square, Swindon

Species: Gleditsia triacanthos

This square in the centre of Swindon's shopping area, created in the 1960's has been pedestrian only since it was created. Home to Swindon's statue of Isambard Kingdom Brunel, who brought the railway to the town, the original trees had caused extensive rooting damage to the paving and had to be removed. As part of the refurbishment of the square, new Honey Locust [Gleditsia triacanthos] trees were chosen as replacements. This attractive tree with a light green canopy copes very well with reflected heat and does well in most soils. It also tolerates polluted air well.



Location: Pace University, New York City, New York

Species: Heritage River Birch (Betula Nigra)

An enclosed courtyard at the heart of these university buildings provides a calm retreat zone for students to relax. This site, situated at the northern end of the Brooklyn Bridge ramp suffers from intense traffic air pollution and noise, but the planting of these River Birch [Betula Nigra] trees mitigates against these city issues. This species, also known as the Red Birch is very suited to wet soil conditions, but once established tolerates extreme heat. Particularly noticeable is the orange/cinnamon coloured flaking bark, giving colour all the year round.



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Location: Duke Street, London
Species: *Liquidambar styraciflua*

This street, first mentioned in a map dated 1723, provides a north/south link between what is now some of London's most elegant areas. Originally designed as a residential street, most of this has become shops and offices. The junction with Oxford Street, the busiest shopping street in London, is dominated by Selfridges department store, built in 1909, which has become a destination in its own right. In 2018, the store opened a new entrance onto Duke Street, and planted four fine Sweet Gum [*Liquidamber styraciflua*] trees, to frame the entrance. The species has a beautiful leaf colouration, shining red and gold in the autumn. A great choice for urban areas.



Location: High Street, London Borough of Bromley
Species: *Liriodendron tulipifera*

At the junction of Church Road, High Street and Market Square, this fine example of the Tulip Tree [*Liriodendron tulipifera*] has become established, providing a peaceful oasis and aesthetic delight amidst this thriving retail area. This species can grow very large, tulip shaped flowers appear on older trees in June and July and leaves turn bright yellow in autumn. Market Square was the original Anglo-Saxon settlement area, and the town has grown from this zone. Bombed during the second World War, the architecture surrounding this area is mixed, with modern and ancient side by side.



Location: Lemon Street, Truro
Species: *Magnolia grandiflora*

The city of Truro was originally established during Norman times, and is the county town of Cornwall, and its only city. During Georgian times it was a wealthy port, and many fine buildings show this. Lemon Street, running down the hill to the original quay on the river, used to be largely housing, but now is largely a shopping area, full of character and interest. Due to narrow streets and exceptional below ground constraints, tree planting is challenging, but a joint effort by local businesses and the local council has successfully planted a Southern Magnolia [*Magnolia grandiflora*] tree, an evergreen species which has large cream flowers during summer and early autumn. Prefers full sun, and some shelter, and can grow to a large tree.

Location: Mare Street, Hackney

Species: *Metasequoia glyptostroboides*

Mare Street has been a main route for over 400 years, but only more recently has it become largely commercial in use. The railway coming in 1872 started some housing development but not until recently has it become a residential borough of choice where buyers, priced out of more central London have bought property here. In this scheme, Dawn Redwood [*Metasequoia glyptostroboides*] trees grace the central median, greatly softening the effect of the traffic, and providing visual amenity. This deciduous conifer is popular in urban areas, preferring moist soil, and tolerates chalk well.



Location: St Peters Square, Manchester

Species: *Paulownia tomentosa*

Previously open land, this now central area become encompassed by the growing city, and in the 1930s, the Manchester Town Hall and Central Library were built here. In 2013, the area was refurbished, the tram stop was enlarged, and new buildings were constructed. A number of new trees were planted, including some impressive specimens of Foxglove Trees [*Paulownia tomentosa*], a spectacular ornamental flowering tree, which if protected from frost, produces beautiful violet-blue “candles” in late spring. Fast growing, with huge leaves, it can make a great contribution to storm water management due to canopy interception of rain.



Location: Roath Basin, Cardiff Docks, Wales

Species: *Pinus Nigra*

The development of Cardiff docks towards the end of the 19th century transformed the town from one of the smallest in Wales to a huge city, to be the second largest export dock of coal in the world. As the docks declined, some of the facilities were decommissioned, and redeveloped for multi-use, and the BBC relocated studios from other areas to a new custom-built premises at Roath Basin, known as BBC Roath Lock. Tree planting here included a number of species, including the Austrian Pine [*Pinus Nigra*] which is particularly suited to maritime and exposed sites, as it is tolerant to salt wind.



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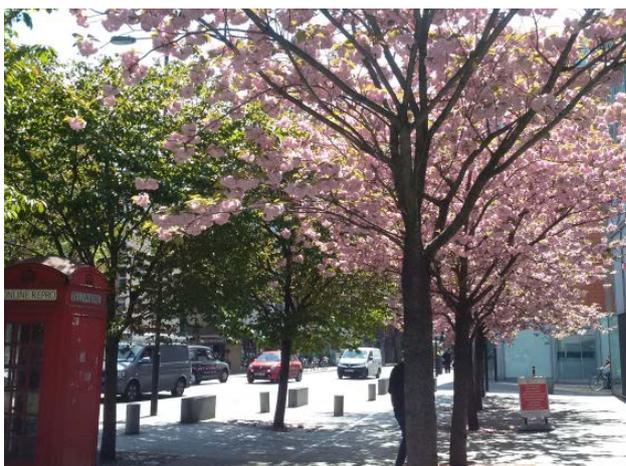
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Location: Torwood Street, Torquay

Species: *Platanus hispanica*

Torquay, one of three towns in Torbay, became popular during the Victorian era as a seaside resort. Having a mild climate, and protected from the prevailing strong westerly winds, many sub-tropical tree species flourish here. However, in heavily trafficked areas, where, in summer, the streets are full of holiday makers, the London Plane (*Platanus hispanica*) tree is always a favourite. As a hybrid clone, this tree copes well with both drought and wet soil, compacted and polluted environments, and with large leaf size, assists with storm water management. Very vigorous in rooting, careful planning is required to ensure hard surface integrity.



Location: Tanner Street, London Borough of Southwark

Species: *Prunus Kanzan*

This small pedestrian area, created during road realignment roads, is in the centre of the artisan trades area of Bermondsey. Many of the original livery companies had their origins in this compact network of streets, and many street names reflect this past, including this one! Very close to London Bridge station, this region was devastated in the second World War, and since then has been developed largely for residential purposes as it is very close to the main business districts. Here two different species of flowering cherry [*Prunus Kanzan* and *Prunus sargentii*] have done well, and because they flower at slightly separate times, give a long-lasting flower show and attractive autumn colour. Does best on free draining soils.



Location: James Shaw Crescent car park, Kilmarnock

Species: *Betula utilis Jacquemontii*

Kilmarnock Railway arches, the most distinctive feature of this Ayrshire town, were restored and the whole surrounding area was upgraded during 2015. The 23 masonry arches are attractively uplit with blue lighting, complemented by Silver Birch (*Betula utilis Jacquemontii*) trees, with their stark white bark, illuminated from in ground floodlighting. This commonly used species is successful in most soils, and as a pioneer species, is well able to establish itself in demanding locations without much external support. Fast growing, with a light translucent canopy, it is very popular in urban situations.

Location: Watchet Esplanade

Species: Quercus Ilex

Under Alfred the Great, Watchet became an important port on the Bristol Channel, with maritime trade exporting ore from the nearby hills to the steelworks across the bay in Wales and bringing back coal. Latterly, most of the port trade was with European timber imports, and exporting vehicles and other UK manufactured goods. With the decline of small commercial shipping trade, the port closed, and was reopened as a marina, servicing pleasure boats and small fishing vessels. The Esplanade was originally created in 1843, and refurbished in 2008 to service the increasing tourist trade, with seating and viewing areas, and planted with Holm Oak [Quercus Ilex] trees. These fine slow growing evergreen trees are ideal for coastal planting, and cope with most urban sites, but not in cold areas.



Location: Television Centre, White City, London

Species: Quercus palustris

This site was the main television broadcasting centre from 1960 to 2013, when the site was sold to release funds for the BBC. Centred around listed, very recognisable buildings, the site has been sensitively redeveloped, retaining much of the original structure, providing homes, offices and retail outlets across the 12 acre site. Central to the planning permission was to plant a number of large trees to soften the view from the street, and these fine Pin Oak [Quercus palustris] trees have radically changed the street scene. A tough urban tree that copes with limited periods of waterlogging, it produces fine autumn colour as the leaves turn scarlet.



Location: London Borough of Hackney

Species: Sorbus aucuparia

This central London borough has an outstanding record in diversity of tree planting, proving that highly urbanised conurbations need not be limited in species choice. At the time of print, over 300 different species have been planted in the streets of the borough, filling the area with interest and year-round colour. Here we show the Rowan, or Mountain Ash [Sorbus aucuparia] which is possibly one of our most beautiful native trees. This specimen has yellow berries, but other berry colours are available, and this provides great interest for bird life. Prefers areas without reflected heat, and slightly acid soils..





Location: The Broadway Centre, London Borough of Hammersmith and Fulham

Species: *Tilia Cordata*

This, one of London's busiest traffic junctions, incorporates a shopping centre, two underground railway stations, a bus station and surrounded by a gyratory system carrying thousands of vehicles per day. Built during the early 1990s, some trees were planted to help soften the building, and to provide some relief from the traffic noise and pollution. Poorly planted, these original trees failed and were replaced with these six Small-leaved Lime trees [*Tilia Cordata*] in a shallow but adequate tree pit. This cultivar of Lime is able to cope with air pollution and is not subject to aphids, so avoids the honeydew issue.



Location: Sainsbury Laboratory, University of Cambridge

Species: *Tilia henryana*

As part of the University of Cambridge, this facility was built in the Botanic Garden to house 120 plant scientists studying plant development and diversity. Opened in 2011 by Queen Elizabeth II, it allows for research to be carried out under controlled conditions and incorporates 300m² of growing area under glass. The public café area is planted with Henry's Lime [*Tilia henryana*] which has very unusual leaves, with are edged with bristle like teeth, looking similar to a Venus fly-trap. This tree flowers in the autumn, and should be planted in a sheltered location.



Location: Sloane Street, London

Species: *Washingtonia robusta*

Sloane Street was set out during the 1770s for Charles Sloane, then Earl Cadogan, and much of the land is still held in the same family, under Cadogan Estates. Some post war developments were constructed which did not match the traditional style and have been redeveloped. This particular development features a beautiful garden courtyard, planted with Mexican Fan Palm [*Washingtonia robusta*] trees, and other planting, providing a retreat just off the exclusive Sloane Square. These palm trees have a potential lifespan of over 500 years, but need a sheltered spot, as they are not truly winter hardy.



An invaluable guide for specifiers on species selection for green infrastructure written by Dr Andrew Hirons and Dr Henrik Sjöman and developed as part of a NERC sponsored project involving University Centre Myerscough, Lancaster University and Trees & Design Action Group.

Available at greenblue.com/resources



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Studies have identified a correlation between **large street trees** and a **fall** in crime rates.

Maintenance

Phase 1

The establishment phase – If the tree is to succeed in the longer term, correct care in the first three years is vital. Ensure that your programme of maintenance covers:

Watering – even one instance of drought can have life threatening consequences for the tree. Waiting for leaves to show loss of turgor and drought stress before watering is too late. Ensure watering is proactive and applied deeply enough to be beneficial. The watering should be phased out over three years to encourage the tree to establish its own root system in relation to existing groundwater conditions.

Weeding – competition for scarce water between trees and weeds can be intense. It is good practice to maintain a weed/grass free area around the tree. This will also keep damaging strimmers at a distance if in turf areas.

Regular inspection – check for tree stability, loosen tree ties as the tree grows and remove at the end of three years. Countless trees have been strangled by ties. Check for early signs of disease, stress, chlorosis etc – quick action will be the most beneficial. Damaged limbs should be pruned carefully. Irrigation/aeration inlets should be checked and cleaned annually.

Phase 2

The tree is now semi-mature and establishing well – maintenance requirements should be low and relate mainly to crown raising if required by traffic constraints. Regular inspection by qualified personnel would be a great advantage addressing any needs.

Phase 3

The final phase as the tree approaches the fully mature stage. Maintenance requirements for mature tree stock can be specialist and extremely varied so are not covered by this manual. Again if the tree pit has been carefully designed and the correct species chosen for the location, maintenance will be very low and the tree can be expected to provide wide benefits and pleasure, for a huge number of people, for many years to come.



6

Particulate levels on tree-lined streets can be up to **60%** lower than those without trees.

Mare Street, Hackney, London

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Selfridges, Duke Street, London

Case Studies & Projects

Pleasing, beautiful and sustainable landscapes do not happen by accident, or by happenstance of nature. At **GreenBlue Urban**, this is an article of faith, because landscapes are our business, and the successful integration of trees into challenging and demanding urban environments is our mission.

Since 1992, the focus of our research has been collaboration with architects, designers and other tree-planting professionals. Our work has been to develop excellent tree pit designs that give newly planted urban trees the best chance and advantage for reaching their full maturity and potential.

We like to work with you – from the planning stages and beyond – to ensure you benefit from our ‘tree-literate’ design expertise and the technologies we have developed to provide long-term, urban-tree planting and management solutions. We will assist you in evaluating comprehensive tree pit designs, specifications and installations that are right for your needs, ambitions and budgets.

At **GreenBlue Urban**, we will also give you best practice guidance on tree pit layouts and tree-planting methods. We offer quality advice on practical and cost-effective products that promote tree establishment and maintenance, their compatibility and adaptability in different locations. Take advantage of both our on-site and telephone technical support service across the United Kingdom, North America, and around the world.

We are happy to work with your own architects, designers and building contractors to ensure you get the best design, installation advice and assistance. Dedicated to service excellence and product sustainability, **GreenBlue Urban** goes the extra distance in making sure your trees live – and thrive – in urban settings.



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Case Study:

Selfridges, Duke Street

Project Type

Public Realm

Client

Selfridges

Contractor

FM Conway

Products Used

Custom Brass Tree Grilles,
RootSpace, StrataCell,
ArborVents for Aeration, Root-
barrier

Selfridges also known as Selfridges & Co the high end retail department store based in the UK was founded by Harry Gordon Selfridge in 1908. The flagship store in London's Oxford Street is the second largest shop in the UK after Harrods and opened on 15 March 1909.

The 50's saw the acquisition to the Lewis chain, the 60's the Sears group and moving closer to present day in 2003 the chain was acquired by Canadian based Galen Weston for £598 (\$756) million.

Taking on the Selfridges brand, enhancements were made to the flagship store rather than expand, these included innovative dining experiences such as the "Big Rooftop tea and golf party" famous for its emerald green boating lake.



The striking new entrance to Selfridges along Duke Street

An elaborate recreation of innovation as empowered by the founder Harry Selfridge himself. With on off talks of the pedestrianisation of Oxford Street and the launch of the new Elizabeth Line in 2019 which is set to bring an extra 60 million visitors to the area annually, Westminster Council have stated that a priority would be to enable more green space thus tackling safety issues and to help limit air pollution.



A combination of **StrataCell** and **RootSpace** were used to provide uncompacted soil volume whilst working around busy services and other site constraints.



RootRain Civics around the Rootball and **ArborVent's** with custom brass grilles were included to ensure the soil stays aerobic.



High strength **Zeta** tree grilles were customised to allow for the beautifully made brass tree grilles to be installed.

Case Studies

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In-keeping with the high-end theme to Selfridges new entrance on Duke Street, GreenBlue Urban were asked to design custom tree grilles, finished in marine grade brass.

Selfridges proceeded with a Public realm development to upgrade the eastern side of the store on Duke Street as the new focal point entrance to include; new paving and furniture; a new stone bench and stone drinking water fountain made of Italian marble along with planting of 4 established trees.

GreenBlue Urban are proud to have been chosen in the tree planting aspect from concept to design and installation of 4 Liquidambar trees at this high profile streetscape redevelopment.

Two years of design team meetings alongside Djao Rakitine, WSP and Sir Robert McAlpine enabled **GreenBlue Urban** to be fully immersed in the tree pit detail to ensure optimal tree growth for years to come along with minimal maintenance.



Our technical expertise proved invaluable with the selection of the trees at a specialist nursery based in the Netherlands along with the design and manufacture of 4 custom handmade brass tree grilles.

Assisting key contractors onsite including Nurture Landscapes who fully support the GBU tree pit concept with full training given from initial excavation, avoidance of services, install of soil cells, root management, guying, and soil for each tree pit ensured installation was a resounding success.



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Case Study:

Navy Pier, Chicago, Illinois

Project Type

Public realm

Client

Navy Pier Inc.

Landscape Architect

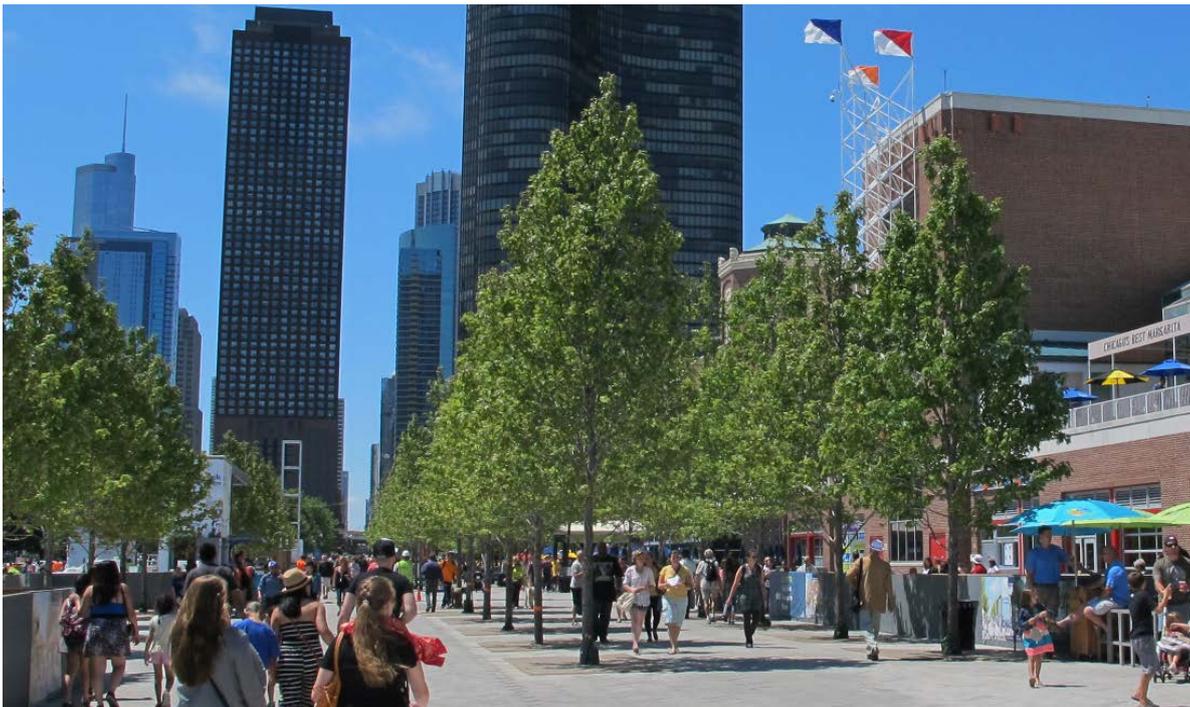
James Corner Field

Products Used

StrataCell, Root Management

Chicago's Navy Pier redevelopment project has been designed to revitalize 50 acres of urban lakefront area. The Navy Pier is already a spectacular global destination enjoyed by millions of visitors each year. This regeneration scheme will be a model of sustainability for the city that will improve the health and vitality of the local community.

Designed by renowned landscape architecture firm James Corner Field Operations, the plan puts the latest in ecological design principles and environmental best practices to work. Calling for a complete transformation of the Navy Pier's outdoor landscape into a more vibrant setting for recreation and social life.



With the keen emphasis on environmental sustainability, the project contractor and architect turned to **GreenBlue Urban** to provide the systems required to ensure longevity of the trees being planted. Using **GreenBlue Urban's ArborSystem**, the Navy Pier was able to ensure that the new trees planted would live a long and healthy life - while providing the load bearing characteristics required for the area.

The resulting green oasis will invite visitors to escape the hard edges of the downtown city and enjoy unfettered views of the majestic waters of Lake Michigan in a more natural setting. Through this sustainable design, the Navy Pier has the potential to make a major positive impact on the environment.



Centennial
Celebration

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Case Study:

Pace University, New York

Project Type

New Infrastructure

Client

Pace University

Landscape Architect

AECOM

Products Used

StrataCell

The One Pace Plaza project for Pace University required the total removal and replacement of all planting, paving, seating, lighting, decorative fountain, and related site appurtenances. The revitalized courtyard is now more functional and welcoming, and new trees are located within the paving system where the **StrataCell** system was installed.

AECOM designed the complete renovation of the Pace University courtyard, which started in June 2012 and was completed in October 2012, with a total budget of \$900,000. One Pace Plaza is the flagship building complex of Pace University. Located directly across from City Hall and adjacent to the Brooklyn Bridge, the building was designed specifically for the university and completed in 1969. It houses most



of the university's classrooms, administrative offices, student union, community theater and an 18 floor high-rise known as Maria's Tower.

"The client wanted to create a central gathering space that was flexible with seasonal interest and a more contemporary design in keeping with year round school programming, and also matching raised standards in other campus and lower Manhattan neighborhood renovations that are lifting the overall aesthetic character of the neighborhood," explained landscape designer Adrienne Weremchuk.

Anthony Scordia, of Scordia & Associates, says the **ArborSystem** replaced a previously specified competing product. Two tiers of **StrataCells** were used together with **RootStop** barriers. The **StrataCells**, manufactured from 100% recycled plastic, is assembled to form a skeletal matrix that supports sidewalk and traffic loads. This features almost five times more available growing media compared to the traditional structural soil, therefore facilitating healthy root growth. **RootStop** is a continuous non-ribbed root barrier designed to protect infrastructure and services.

Although this is the first time the contractor used **ArborSystem**, they were impressed with the ease of installation. “The system was easier to install than I thought it would be once the area was prepped,” Anthony says. Adrienne Weremchuk continued saying, “the system provided a solution to the design intent of a completely paved courtyard with trees throughout.”



The **StrataCell** is intended to sustain the trees with a larger soil bed that would allow for more extensive root establishment, while structurally supporting the paver system above. While the systems modularity allows for more flexibility in layout.

By the time the **StrataCell** was delivered to the site, the paving system including its drainage subbase, was already installed. The original design had called for surface drains but was changed to a permeable system that allowed water to drain through to a subsurface drainage system that required the installation of 18" gravel.

They filled the entire site with the drainage gravel then excavated the areas to receive the **StrataCells**. Because of their experience, the contractor says they will use **ArborSystem** in future projects that specify for such a system. AECOM agrees with the contractor and adds that the client is very happy and satisfied with the courtyard.



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Case Study:

Union Station, Toronto, Ontario

Project Type

Commercial / Streetscape

Client

City of Toronto

Landscape Architect

AECOM

Products Used

GreenBlue Urban ArborSystem
Package (See page 29)

The Union Station subway platform and concourse improvements situated on Bay and Front Street offered a revitalization to the heart of Toronto's financial district. The project consisted of the train and subway station expansion and renovation, which provides additional concourse space and a new second platform, including new electrical, mechanical and communication rooms.

This expansion doubled the size of the current subway platform, further improving the flow of Toronto Transit Commission and Go Transit passengers. The project also included a pedestrian corridor for GO Transit riders to bypass the TTC's paid area, and a separation of eastbound and westbound subway platforms. During construction,

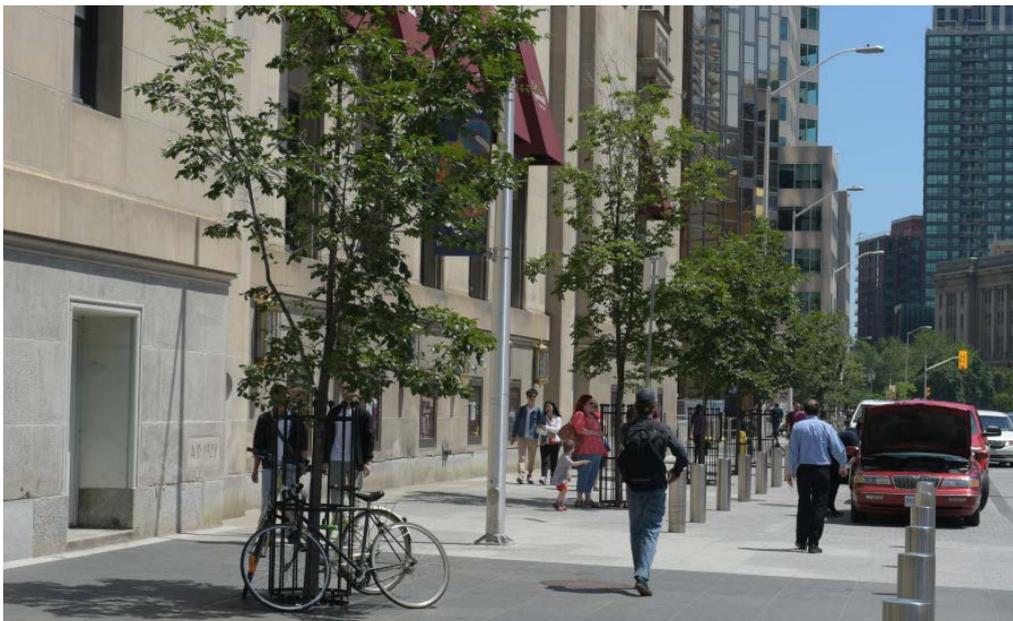


the installation team encountered some utilities and underground infrastructure challenges in the tree pits, but these were easily worked around and the **ArborSystem** assembly went extremely well and according to plan.

AECOM, a large multi-disciplinary firm that has worked on various projects with **GreenBlue** over the years, was responsible for the landscape architecture elements of the project. Because of Union Station's high profile location, AECOM's goal was to create a space that further epitomized the busy downtown setting.

The landscape architects involved were determined to provide the area with long-lasting street trees that would reach full maturity in the coming years. They worked to maximize the soil volume available by linking the tree pits together.

There were approximately 21 trees on this project, all utilizing the entire **ArborSystem** tree planting package – from **StrataCell** structural support modules providing plentiful rooting volume, to **ReRoot** and **RootStop** root management allowing healthy root growth while protecting the sidewalk and nearby utilities, to **RootRain**



irrigation & aeration offering the tree's rooting zone essential nutrients, to tree guards and grates protecting the trees in their vulnerable youth – the **ArborSystem** provided everything the trees on this project need to not only survive for years to come, but thrive!

Case Study

Canary Wharf Crossrail

Project Type

Public Realm

Client

Foster and Partners

Contractor

Gillespies

Products Used

StrataCell, Root Barrier

The award-winning Canary Wharf district has been under construction for 28 years. London's centre of gravity will be given a further substantial yank eastward when Crossrail, the fast east /west rail link opens in 2018. Canary Wharf Crossrail station will be the largest, and probably the busiest intersection points on the line. Over 100,000 already work in the estate with many more to follow. The Wood Wharf residential project will add 3,200 new homes by 2019.

Foster and Partners have masterminded this £500 (\$630) million flagship station project. 'Crossrail Place' draws together the historical maritime, commercial and botanical dockland background. On eight floors (four of them below water level), it embraces transport, retail, leisure and



Planting complete: an inside look into the new Crossrail Place garden

a public, 5,300 square metre (5700 sq-ft) semi-tropical roof garden. Its position near the Greenwich Meridian is reflected in beds divided between Eastern and Western flora.

On the opening of the striking, ship like semi-open roof structure containing leisure facilities and garden, Lord Foster said: "Crossrail is an important investment in infrastructure that will have benefits not only in the short term, but also for future generations.

The social magnets of shopping, bars, restaurants and a public garden are also part of an enlightened partnership between the public and private domains”.

Gillespies, a leading landscape architecture and urban design practice, were entrusted with the garden design. With a passion for creating inspiring, dynamic projects they appointed Growth Industry Ltd to deliver specialist consultancy advice on species selection. Blakedown Landscapes were the masterminds in installation, co-ordinating specialist planting, bespoke irrigation, feature walls, a specially constructed concrete walkway, paving and seating.

GreenBlue Urban were delighted that their products, including the modular structural **StrataCells** affording optimum load bearing and root welfare environments, were integrated into the scheme. Along with their ribbed **ReRoot** root training systems these products will provide the needed soil volumes and controls for many years of potential growth and environmental benefit and deliver low maintenance requirements.



StrataCells were specified in order to provide trees and plants quality uncompacted soil medium.



Root barrier was used around the perimeter of the **StrataCell** matrix in order too effectively manage tree roots.



The finishing touches are added to the Crossrail project.

Case Study

Greener Grangetown, Cardiff

Project Type

Streetscape

Client

Cardiff County Council

Landscape Architect

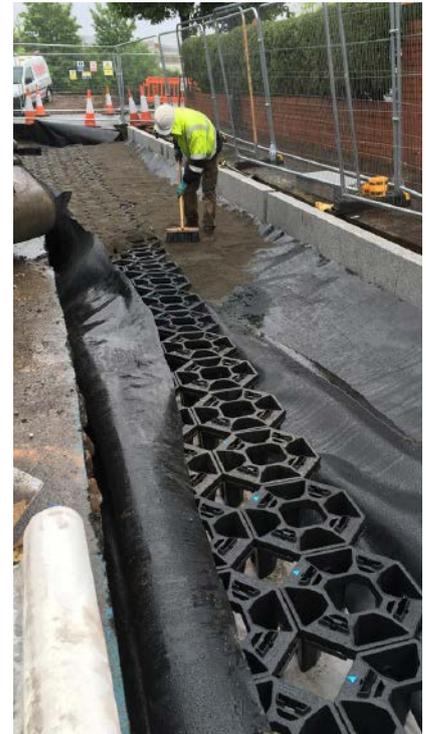
Arup

Products Used

StrataCell, Root Management

For many older cities and towns, sustainable water management has been steadily rising up the agenda for years. Existing ageing infrastructure built for a different era and population, coupled with increased hardscape areas and roads for today's living means that drainage infrastructure is at or above capacity.

Heavy downpours result in the system being overwhelmed resulting in flooding and associated pollution and damage. The harsh reality is that there are few affordable options to improve existing drainage pipe networks. What can be done, however, is develop sustainable and resilient SuDS / LID systems that mimic natural drainage, allowing surface run off to be managed as close to the surface and as close to its source as



practicable. 'Greener Grangetown' does just that, by re-landscaping the urban realm with soft landscape and SuDS / LID interventions.

Greener Grangetown in Cardiff is a very interesting example of the successful retro installation of SuDS / LID features into an existing urban streetscape.

Working with Arup, and project partners - City of Cardiff Council, Dŵr Cymru Welsh Water and Natural Resources Wales - [GreenBlue Urban](#) were closely involved with advising on the tree pit installations, and assisting the GG team from concept through to completion.



The Greener Grangetown project is located in one of Cardiff's most densely populated wards. The project area runs alongside the infamous Rivers Taff, Wales' busiest cycle network. Work was undertaken on 13 streets: Aber St, Abercynon St, Bargoed St, Blaenclydach St, Coedcae St, Clydach St, Cymmer St, Ferndale St, Llanbradach St, Taff Embankment, Taff Terrace and Ystrad St.

Prior to the commencement of this scheme, the rainwater flowed into the sewer, mixed with wastewater from kitchens and bathrooms and was pumped around 8 miles to the Vale of Glamorgan, before being treated and released out to sea. By removing this rainwater from the sewer, Dŵr Cymru Welsh Water have reduced the energy used for pumping and treating the wastewater. At the same time, by doing this, they have freed up some space in the sewer to help the region adapt to more extreme weather conditions which are caused by climate change.

A Solution with Multiple Physical, Social and Economic Benefits

As well as slowing the flow, cleaning water naturally and reducing the financial and carbon costs of pumping wastewater, a key goal was to ensure that Greener Grangetown delivered a wide range of other of economic, social and environmental benefits.

Martyn Evans, Project Lead from Natural Resources Wales, said "The new street designs included installing attractive rain gardens and kerbside planting areas.



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These not only enhance local biodiversity and wildlife, but deliver important improvements to water quality in the River Taff, and encourage water efficiency. By creating more green areas we've opened up new opportunities for people to enjoy walking, cycling and other recreation close to where they live and work. More greenery and tree planting also means noise and pollutants are better absorbed, and air will be cleaner too."

As well as forming part of the rain garden strategy, the trees and shrubs bring a cohesive identity to the Greener Grangetown area. The layout, species, shapes and colours of the planting gives each street an individual look. In total, 135 trees have been planted - and a total of 19 different species.

All the trees share certain characteristics. They are:

- Generally deciduous so that natural light is maximised during the winter.
- 'Street trees' that can tolerate urban environments.
- Trees that provide interest all year round either due to leaf colour, bark or flowers.
- All trees are UK provenance.
- Trees with appropriate root volume provision, and designed for long term tree health.
- Trees with a 2.5 (8.2ft) metre clear stem to ensure establishment and deter vandalism.
- Tree species with a high biodiversity value.

The Tree Pit and Rain Garden Design team at Arup, working alongside tree officers at the City of Cardiff Council, urban tree and soil science specialists at Natural Resources Wales and [GreenBlue Urban Ltd](#), put a design emphasis on long term sustainable tree planting for the raingardens and tree pits. Where possible, tree pits were linked below ground, increasing available soil volume for the trees, and simultaneously increasing water attenuation capacities, a true win-win.

Uncompacted soil media is vital in these situations - as tree health depends on the macro and micro pore structure within the soil. The structural components such as **RootSpace** and **StrataCells** look after the physical structure of the soil, enabling the soil to look after the tree. This simple philosophy has served urban tree planting projects very well since first introduced globally by [GreenBlue Urban](#) back in 2001.



The Client Project Lead from Cardiff Council and instigator of the scheme Ian Titherington stated, “**Green Blue’s** input into the project has been a critical element, in delivering a truly green environment into streets previously largely devoid of such advantages. Working alongside our excellent design team from Arup, they have helped to already transform the street scene and peoples’ perceptions of the area; this being achieved before the trees have been located for more than two seasons.”

He concluded, “The success of this project must be judged on its ability to be a catalyst for many other similar schemes, and properly designed urban tree systems like **Green Blue’s** designs are to my mind essential, in delivering the multi-benefits that urban retrofit projects must deliver for their communities.”



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Case Study:

Lansdowne Park, Ottawa, Ontario

Project Type

Commercial / Streetscape

Client

City of Ottawa

Landscape Architect

CSW & PFS

Products Used

GreenBlue Urban ArborSystem
Package (See page 29)

The regeneration of Ottawa's Lansdowne Park was planned early 2009 as part of a series of city-wide redevelopment initiatives. Lansdowne Park is a world-class attraction that "blends modern amenities, courtyards, heritage buildings, and green space". The area is situated in the heart of Ottawa as a "model of modern-day innovation in an urban form where people can go to walk, cycle, shop, enjoy a good meal, be entertained, work, live, and play" - all in an environment respectful of the city's architectural heritage.

The plan included the renovation of the TD Place stadium, mixed-use area with shops, residences and offices, and the 18-acre urban park. The main aim of the refurbished stadium was to "seamlessly integrate the



facility into the new urban setting by using varied and natural features". It will host sports events, concerts, and performances by headline acts. The first major park event in the renovated stadium was held in July this year.

The proposed mixed-use area aims to create a "unique urban village that includes a mix of commercial and residential buildings, open spaces and corridors, which will serve a variety of purposes. This component of the redevelopment plan provides a unique pedestrian environment focused

on a retailing area that will complement and support activities at Lansdowne and be integrated with existing commercial uses along Bank Street.”

Jeffrey Staates, partner at PFS Studio and project landscape architect for Lansdowne Park, has been involved with the project since 2010 and led the team for the international design competition. They were tasked with the redevelopment of the urban park in June 2010 and started design in July 2010.

The **ArborSystem** was included in the recommendation to pursue the largest soil volume possible from the standpoint of



longevity. The major installation of soil cells was in the centre of Aberdeen Square, named after the heritage structure in the site.

“There were concerns about the longevity of trees. Given the soil volumes we wanted to achieve and the time frame, the **ArborSystem** seemed like a reasonable product to accept as an alternative,” Staates said.

The Aberdeen Pavilion at Lansdowne Park is a city landmark, and home to the Ottawa Farmer’s Market. The park features more than 800 trees, including an orchard of heirloom apple trees.



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StrataCell being customised and cut in half to fit tight below underground constraints.



Staates said he isn't aware of any issues with the product during installation and after the project was finished. The only complications with the project were more in terms of jurisdiction. The team was obliged to consult with several organisations with lengthy approvals of plans and a number of jurisdictional reviews that had to be satisfied. But in the end, all bodies approved the use of **ArborSystem**.

The design also allowed for the collection of stormwater from the roof of the horticulture building and recycling water from the water play area in the urban park and using that for irrigation at night.





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Case Study

St Peter's Square, Manchester

Project Type

Public realm

Client

Manchester City Council

Landscape Architect

ARUP

Products Used

StrataCell, Root Management,
Custom tree grilles

Creating an Northern Powerhouse isn't just about the grey infrastructure and nowhere is this more evident than across Greater Manchester.

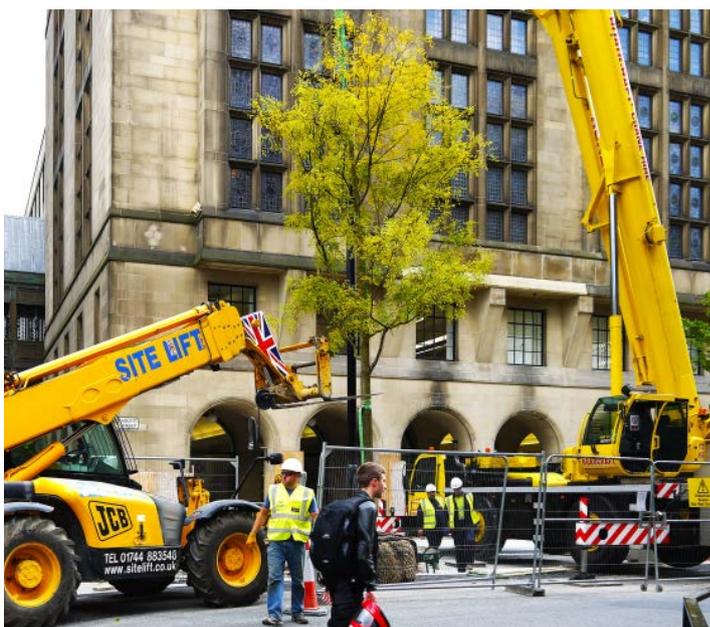
GreenBlue Urban have a proud track record of working with partners across the GMCA to deliver quality urban tree planting in a variety of complex contexts. This is aptly illustrated with installation of urban trees as part of the St Peter's Square redevelopment project. Working with the German landscape architecture practice Latz und Partners together with ARUP for the client Manchester City Council, we were able to co create a new public realm for a self-confident and justifiably proud Manchester citizenry.



At St Peter's Square, there was the ambition for a continuous hard surface to HGV loading requirements in the area where a lot of trees were supposed to be planted. The tree pits had to be designed for the entire life span of the trees which were planted at an already semi-mature size, so there was requirement for sufficient rooting space and soil, need of

aeration, irrigation and drainage for this period. Our aim was to have maximum contact between the rooted area and natural surface air whilst the aperture around the trunk was limited by the structural concrete slab supporting the paving and the potential traffic on top. As the tree pits are between 16m² and 25m², the area underneath the slab was quite large, as were the calculated forces. The cell system provided the ideal response to that challenge, as they could take the loading in the long term much better than mere structural soil, and minimise the risk of settlements. As the pits were constructed in an urban environment with a multitude of existing utilities, it was particularly advantageous that the cell system is highly flexible in layout, and easy to combine with root directing systems. The aperture was eventually covered with a steel grille whose frame was fixed onto the concrete slab, resulting in an entirely walkable surface. – Latz und Partners.

Classed as a conservation area St Peter's Square trees are of crucial importance to the environment. With proximity to the very heart of the city, near the central library and the main metro stops, it was critical to provide a focal point that was characterised by good quality, extensive canopy cover; a space that was adaptive and attractive, fit for the future.



GreenBlue Urban's **StrataCell** soil cells were used to provide these trees with quality, uncompacted soil.



One of the most exciting aspects of the project was the way in which trees were integrated as part of the transport infrastructure, i.e. the tram stops. We spend so many days of our lives waiting for public transport and commuting, it is only fitting that our urban trees provide some respite from this somewhat monotonous daily experience.

Both the clients and the designers understood the necessity of using a long-term solution for planting trees in such a densely populated urban environment with numerous above and below ground constraints. The tree pits are so much more than a basic hole in the ground. With adequate space, soil, irrigation and aeration, the pits are also designed to provide lighting and an integrated power supply.

GreenBlue Urban were proud to supply 60 series **StrataCells**; **ArborVents**; Bespoke Tree Grilles and Geonet for the 22 trees including the Japanese pagoda tree (*Styphnolobium japonicum*), the foxglove tree (*Paulownia tomentosa*), the London plane (*Platanus – acerifolia*) and the pin oak (*Quercus palustris*), each having been grown in specialist nurseries for up to seven years.



When asked to comment on the scheme post installation, our partners at City of Trees, as well as contacts at Manchester City Council, referred to the transformation of the space as transcending the merely physical.

It has encouraged a different use of the space, from a mere thoroughfare to a destination of choice in its own right for the moments between work meetings, before an evening out or a weekend taking in the culture of this thriving metropolis.

Described by the Manchester evening news as a historic site steeped in democratic history, **GreenBlue Urban** are proud to have been part of a process that gives this space back to the people, and an accessible green space, that will deliver the ecosystems services for future generations.



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Case Study:

Sandwich Quay

Project Type

Public realm

Client

Dover District Council

Trees

Pyrus Calleryana Chanticleer

Products Used

RD1050 Root Directors

Stratacell 30 series

Arborvent double inlet

Arboresin precast tree grilles

Ullswater tree guards

Set in the historic coastal town of Sandwich, Kent, this thoughtfully designed quayside regeneration project has hugely enhanced the area. The trees have been planted in a complete **ArborSystem package**, which utilizing a natural porous stone tree grate blends effortlessly with the traditional cobbled surface surround.

The waterfront is a natural relaxing space for people to enjoy and in years to come will benefit from well-established leafy trees - providing shade and softening the landscape.

The soil beneath the paving is protected by the use of **StrataCells** - preventing compaction and keeping vital, soil structure open.



Twin inlet **ArborVent** aeration units allow the soil beneath the paving to breathe and an additional irrigation point is integrated in the tree pit surround.

Paving heave - so often associated with surface rooting trees has been designed out by use of the proven **RootDirector** product, so the trees in this beautiful location will continue to enhance the site without creating trip hazards for pedestrians.



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Case Study:

Goldhawk Road, London

Project Type

Retrofit SuDS /LID tree pit into existing street

Client

Local authority

Contractor

Civil Engineering Group

Products Used

StrataCell, ArborCell, Root management

Goldhawk Road is a very busy main thoroughfare in West London - it is the main A402 road into Shepherds Bush. As an existing typical London street, it carries a large volume of traffic - and of course with so much impervious surfacing, contributes to high stormwater run-off levels.

London Borough of Hammersmith and Fulham were obviously concerned to reduce loadings on existing storm drains and engaged specialist SuDS / LID consultants Bob Bray associates, and **GreenBlue Urban** to create a retro fit tree pit design to provide attenuation at the same time as introducing additional trees along this principle road artery.



Installation of the StrataCell tree pit on Goldhawk Road.



As is ever the way with existing streets, below ground was a labyrinth of services and utilities, necessitating a modular design which would be flexible enough to accommodate these services and still provide optimum rooting conditions and provision for drainage.



Goldhawk Road photographed in summer 2018.

Working closely with the civils contractor, the consultants and the client, **GreenBlue Urban** assisted both in the design phase, product supply and with site visits during construction to ensure a successful installation.

The design incorporated soil cells, root ventilation, drainage, flow control chambers and overflow provision. The key objective with this type of tree pit design is to remove the likelihood of prolonged water logging which could be detrimental to tree health. Soil type is also critical and **GreenBlue Urban** were able to provide a one call supply for all the tree pit components, which reduced contractor administration time and cost.



StrataCells being filled with ArborSoil Hydro to provide uncompacted soil medium.

7

Trees can have a positive influence on the behaviour of traffic and act as a **traffic calming** tool.

Victoria Street, London



Research Insights

■ Re-excavated tree	220
■ Root Radar survey	222
■ Leaf Chlorophyll Fluorescence Testing	224
■ Hadlow College Trial Tree Pits	226

Particulate levels on tree-lined streets can be up to **60%** lower than those without trees.

Research

In addition to keeping abreast of international developments in the urban tree planting sector, **GreenBlue Urban** have their own research plantings at locations around the world and are actively supporting two leading Arboricultural Universities, in their own trials.

Over the years, an impressive collection of data has been accumulated and continues to grow. The research conducted by **GreenBlue Urban** is not without its own challenges and live street tree excavation, although to be desired, is rarely an option.

There have been exceptions however, and some of the images shown give a quick insight to product development trials and examples of research plantings.



Extensive trials in conjunction with two leading Arboricultural Universities



The **RootCell** structure underneath this pavement was subjected to 400 passes of an 8.2 tonne (9 ton) axle loading immediately adjacent to the structure and then a further 200 passes immediately above the **RootCell**. As expected, no adverse movement of the structure was detected



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Tree Roots in Soil Cells

An investigation



Background

In July 2011, **GreenBlue Urban** planted a *Tilia cordata* 'Greenspire' tree in a hard landscape paved area, as part of a training and research programme. The tree was photographed during the planting process and the exercise was part of a detailed study into tree root morphology in root management products, and new root extension into uncompacted soil in structural cells.

Tree Pit Construction

A tree pit was excavated approximately 3m (9.8ft) x 3m (9.8ft) and 1.2m (4ft) deep, and the soil cells installed in layers and filled with a sandy loam soil blend. The shallow **RootDirector** was also installed and filled with the same soil.



Soil was worked on to the structure and finally covered with a proprietary geotextile and hard landscape areas constructed using heavy compaction equipment as would be used on standard construction sites. The trial included the use of soil ventilation systems and irrigation and guying products.

Tree Growth

The tree was planted in the system and was watered for the first season after which the roots were sufficiently established to enable the tree to look after itself.

The *Tilia* showed impressive new shoot extension growth in the second, third and fourth years, however the principle reason for this study was to examine the below ground early root establishment within structural load bearing soil cells, to establish exactly how the roots had grown, and to explore the use of root guidance to deeper uncompacted soil profiles.

Four years is only a small portion of an expected tree life span, but the initial establishment phase of root growth is very critical to a trees long term prospects.



The Re-excavation

After the four years had been reached, the hard landscape was deconstructed to allow access to the **RootDirector** and soil cells, exposing the complete soil profile.

An airspade was then used to carefully remove the soil away from the tree root system to the full depth of the tree pit. This method allows us to see the roots without severing them although some of the finer roots are lost, the structural roots are kept intact.



Conclusion

Further to this study, the following observations and conclusions were made:

There was healthy root growth throughout the tree pit system, and to the full depth of 1.2m (4ft) indicating that if aerated and drained correctly, tree roots will have no difficulty in establishing to deeper profiles than in a forest soil situation.

Tree health was regarded as being at the top end of expectations with no evidence of disease or die back.

Soil in the cells was healthy with no evidence of anaerobic soil conditions normally associated with soil at this depth.

Mechanical root management using ribbed **RootDirectors** is an effective technique in eliminating root spiralling and managing roots to preferred long term root zones.



Root Radar



Explores root Deflector and Soil Cell Impact on Urban Tree Root Morphology

The A2 at Blackheath in London represents one of the most arboriculturally demanding locations to plant a tree. One of the principle arteries into London, it was also an interesting location for Parkman Consulting and TFL to trial the use of shallow root management products to protect footpath integrity, in conjunction with the first generation of load bearing soil cells (**RootCell** by **GreenBlue Urban Ltd**) back in 2001. Too often root barriers are used without sufficient thought given to where the roots will eventually colonize, so this was an interesting trial.



There are two stages of root management on this tree pit. The product specified was a ribbed high density root barrier material (**ReRoot600** - **GreenBlue Urban**) - the ribs being required to divert roots downwards to the preferred optimal root zone provided by the soil in the **RootCells**. At the perimeter of the **RootCells**, was a further boundary of root barrier (ReRoot 2000, 0.8m (2.6ft) deep - **GreenBlue Urban**) to ensure that roots reaching the perimeter of the pit were diverted downwards even further from the surface.

The Consultants wanted to provide five cubic meters of load bearing soil volume within the root managed environment, to ensure the tree had an excellent start in life. The tree planted was a 16-18cm girth *Platanus hispanica* (London Plane).

In summer 2013, the tree (now at 720mm (28") girth and 6m (19.7ft) height) health was assessed. As well as visual assessment, leaf chlorophyll fluorescence testing in conjunction with Barcham Trees was utilized, and it was established that the tree health as assessed by this means measured very favorably against nursery stock benchmark readings.



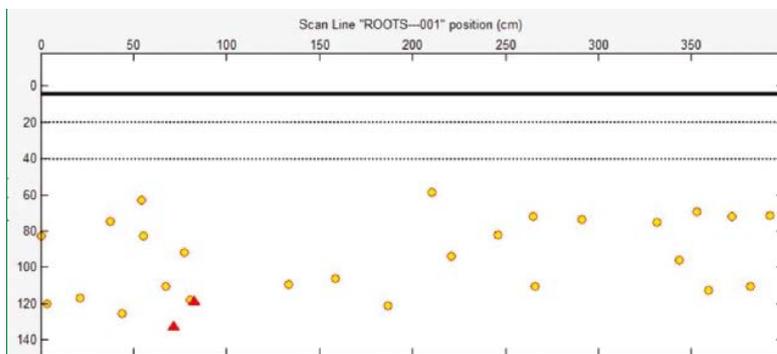
The tree planted at Blackheath, still thriving after 15 years.

The next stage in May 2014, was to involve DF Clarke Bionomique in the use of the latest root radar technology, to map out where the roots actually were after 12 years in this system. This root radar detects the depth and spread of all root over 20mm (0.8") in diameter and a grid around the tree was scanned.

The results were very illuminating. From visual assessment of the surface around the tree, there is a complete absence of root heave or paving deflection associated with this type and age of tree so from this measure the root deflectors have achieved their primary objective.

Below ground, the radar showed the roots to be uniformly spread, having been trained downwards by the root deflector means. They had advanced beyond the initial area of **RootCells** and extended further without returning towards the surface.

A full report is available from [GreenBlue Urban Ltd.](#)



Section through ground - yellow circles indicate roots over 20mm diameter

Leaf Fluorescence Testing on Urban Trees in London



As part of their program of on-going research and development, **GreenBlue Urban** teamed up with Barcham Trees and Think Tree to visit trees planted between 9 and 12 years ago in what was then ground breaking tree pit designs in **GreenBlue Urban** products. The purpose was to assess the health of the trees and the effectiveness of those products which had been used, early in the last decade.

Barcham Trees and Think Trees Arboricultural Consultancy, joined forces for a visit to the capital with **GreenBlue Urban** staff, to assess the health of selected trees planted in **GreenBlue Urban's** tree pit products.

The primary purpose of the day was to combine visual assessment of the selected trees condition, with the use of leaf chlorophyll fluorescence testing to ascertain whether the trees were under any latent stress, not visible to the naked eye.

Barcham Trees, in conjunction with Hansatech Instruments and the Bartlett Tree Research Laboratory, have been gathering chlorophyll fluorescence data on the nursery annually since 2009. This huge database of species specific chlorophyll fluorescence data is compiled into the Arborcheck System which allows arboricultural and forestry professionals to analyse measurements from trees in the field against data from the same species in near optimum conditions on the nursery.

Leaf chlorophyll fluorescence is a method used widely in the plant science research community for assessing the physiological performance of a leaf by analysing the mechanisms of photosynthesis directly. Any stress factors (i.e. over or under watering, deep-planting, herbicide, pest & disease etc) which limit the trees ability to photosynthesize efficiently will be apparent in the chlorophyll fluorescence output in many cases, before visual symptoms are observable.

For **GreenBlue Urban**, the testing was an additional way of assessing the trees health in a variety of tree pit design scenarios. Howard Gray of **GreenBlue Urban** commented " It's one thing to be able to tell people that trees in a particular location and tree pit design 'look healthy', but its far better if we can use science to demonstrate, with empirical data, that the actual tree is indeed as healthy as it looks!"



Barchams also pointed out that this type of leaf testing, whilst extremely valuable, is only one measure of assessing a tree's health and whilst it contributes greatly to the assessment process, it may not tell us everything. We are learning all the time, and as new methods and equipment are developed we will gain a greater insight into the differing benchmarks and diagnostic methodologies to assess urban tree health in view of continuous improvement. This applies to tree pit design, appropriate species selection, treatment of different planting locations, product design and planting methodologies.

In addition to examining the health of these trees in continuous paved surrounds, the surfaces around the tree pit within 15 meters (49.2 ft) was scrutinized for any evidence of sub surface lateral root growth causing pavement heave. All of the trees inspected were planted within either pre formed recycled plastic **RootDirectors** to 580mm (22.8") depth or in one case (Blackheath) the linear roll form ribbed **ReRoot 600** barrier. Significantly there was a total absence of root damage or trip hazards attributable to root growth on any of the locations. However, on two sites, buttress root formation was beginning to lift the cast iron tree grille segments immediately next to the tree trunk. This kind of root formation often develops as the roots thicken to provide stability and is regarded as a 'luxury problem' in as much as it is associated with a successful tree.

Selected sample leaves are 'clipped' for 5 minutes to exclude light before the light sensor (black cylinder) is attached and readings taken.

What is this all telling us? These trees are in excellent health. A spokesman for **GreenBlue Urban** offered the comment, This is another step forward for urban tree pit design, in as much as we have trees planted using root management, in conjunction with load bearing soil cells, for over 10 years now. This is the longest track record of load bearing soil cells globally, as we pioneered their use in the UK. This means these tests have a special interest for us. Whilst we appreciate 12 years is not a huge percentage of a tree's predicted life span, it is a good measure of how the trees can establish successfully in arboriculturally speaking, very difficult conditions - without costly infrastructure damage.

Further ongoing tests are being conducted at other early soil cell projects around the UK and US.

Results of chlorophyll fluorescence testing of trees at various sites across London

19 September 2013

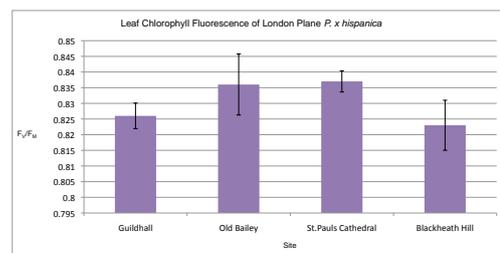


Figure 1. F_v/F_m values for London plane *Platanus x hispanica* trees at various sites across London. Results are shown as mean \pm standard error of the mean of five samples per tree.

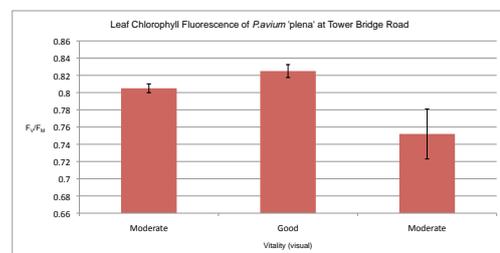


Figure 2. F_v/F_m values for flowering cherry *Prunus avium* 'plena' trees at Tower Bridge Road, London. Results are shown as mean \pm standard error of the mean of five samples per tree (except for the last tree which was the mean of only three samples).

Hadlow College Tree Pit Trials



Control tree (4 years after planting)



Structural soil (4 years after planting)



StrataCell suspended pavement (4 years after planting)

Led by landscape architect and university senior lecturer, Duncan Goodwin, The University of Greenwich is running a University Urban Tree Pit Comparative Study, looking at the various tree pit systems available in today's marketplace.

"For trees to become functionally useful within our urban landscapes, they need to establish and reach a state of healthy, productive maturity. Unfortunately, tree planting is often seen as a piece of 'window dressing' to assist a design scheme through the planning process." commented Goodwin.

At the end of July 2014, 12 tree pits were excavated by groundworks contractor A. Eastwood and, to date, **GreenBlue Urban's StrataCell** and Bourne Amenity's Structural Tree Sand have been installed in six of the pits. This will be followed in mid August by the installation of SilvaCell from Deeproot and Cornell University Structural Soil manufactured, under license, by Landtech

Goodwin said: "This study could not have happened without the generosity of our commercial partners. Each has supplied their systems free of charge. The point of the project is not to set one system against another, but to review them all and see where each can excel. It is intended that this study will be a catalyst for raising awareness of the ecosystem services provided by trees in our urban landscapes."

This long-term project will investigate various methods of ensuring adequate rooting volumes for trees in constricted urban landscapes and **GreenBlue Urban** are proud to be a part of it.

Space and assistance is being provided by Hadlow College and its ground crew, led by head gardener Alex Rennie.

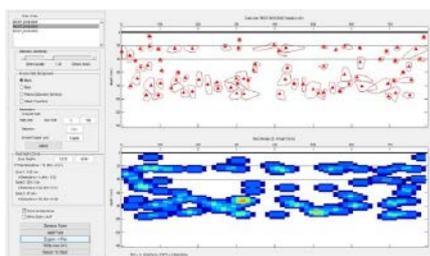
The results in year four, have been very informative, and whilst it is still a very limited time frame for monitoring tree root development, have pointed strongly towards the benefit of initial tree establishment of using an uncompacted soil media. The trial site has enabled us to compare this methodology with both ‘control’ (a normal agricultural ‘field’ situation) and rock soil mixes etc. Working with assistance from Sharon Hosegood Associates, and the University, **GreenBlue Urban** have been active in commissioning a root radar survey on samples across the trial site to see where the roots were by September 2018.

One particularly interesting observation, which has significance for tree planting in hotter climates is the virtual trench scan (illustrated). Here we can clearly see that using an uncompacted soil in a load-bearing soil cell (in this case StrataCell) has allowed roots to establish at a far greater depth. This has hugely benefitted the trees planted in this way and built in drought tolerance via a deeper rooting pattern enabling access to additional groundwater resources. This was borne out by the above ground growth of the trees with the trees in uncompacted soil demonstrating increased canopy volume, new shoot extension and DBH to other planting methods.

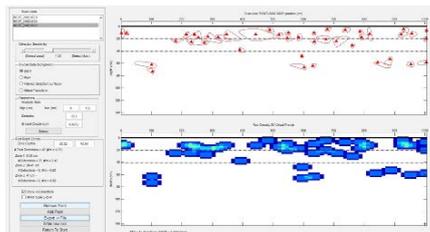
Further monitoring will be ongoing, and it is anticipated that the trees will be re-excavated towards the end of 2019, which will give results which can be co-related to the radar and other test data.

Radar Comparison

Sand based structural soil vs StrataCell/RootSpace after 4 years.



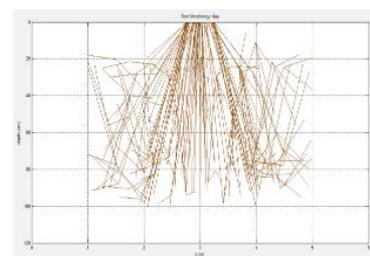
StrataCell / RootSpace



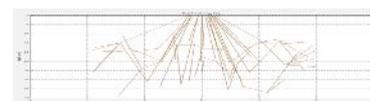
Structural Soil

Virtual Trench Scan

StrataCell/RootSpace vs. Control Tree



StrataCell / RootSpace



Control Tree

Key Note: Control chart horizontal axis lines are at 2" depth increments, StrataCell / RootSpace at 8" increments.



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Three trees placed strategically around a single family home can cut summer air conditioning needs by up to **50%**.

Villiers Gardens, Chobham Manor, London

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Greenblue Urban have enjoyed a long relationship with Milford in Copenhagen, our Scandinavian partner company. Milford enjoy an excellent reputation in Denmark, Norway and Sweden, and are able to offer product and design support across these countries for specifiers and urban planners.

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Gumi Mix Group

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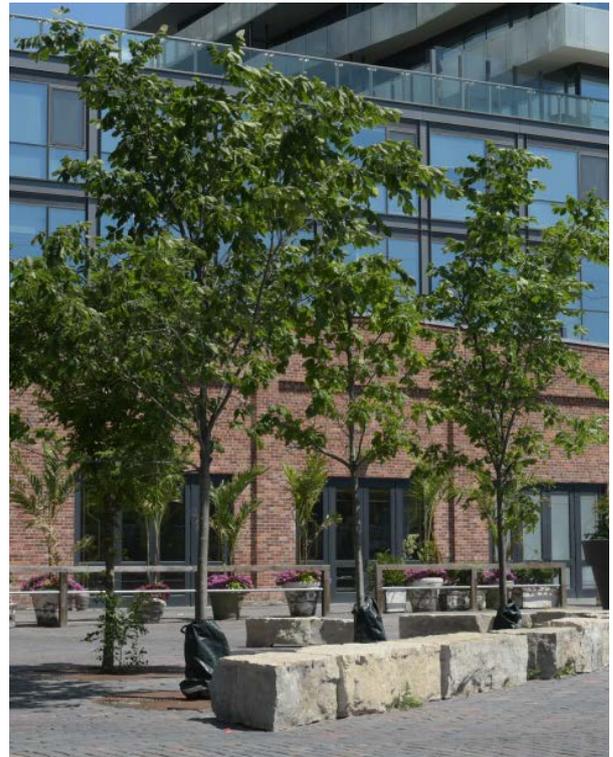
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Darby Street - Auckland, New Zealand



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GreenBlue URBAN

Establishing the future urban landscape



Enabling sustainable cities
through green and blue
infrastructure.



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Bank of Canada, Ottawa, Ontario

Environmental Policy

GreenBlue Urban is wholly committed to achieving the highest standards of environmental performance throughout its operations. The use of energy saving systems installed within our manufacturing facilities results in minimal impact to the environment.

Sustainability is at the forefront of our activities. The majority of our products are manufactured from 100% post consumer waste and consequently are fully recyclable in the future. The aim of our business is to increase the chances of newly planted urban trees reaching their full potential. Consider the environmental benefits of this!

GreenBlue Urban will continue to raise environmental awareness within the company through the development and training of its employees and will openly communicate with all its contacts on relevant environmental issues.

GreenBlue Urban adopts responsible standards as an integral part of its business strategy and studies the environmental impact associated with its products throughout their life-cycle.

The seamless link provided by **GreenBlue Urban** from continual professional development seminars to the overseeing of actual installations ensures maximum efficiency in all areas. This indeed, contributes significantly towards emission reduction.

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Greener Grangetown, Cardiff, Wales

ArborAdvance

Long term urban tree warranty

As a mark of our confidence in the **ArborSystem** tree pit package, **GreenBlue Urban** can offer a 15 year tree health warranty for every tree planted in accordance with our **ArborAdvance** tree planting methodology.

What does this mean?

If a tree is planted within the approved system, and in certified accordance with our structured tree planting methods, and maintained as per our guidance, we will guarantee that this tree will be alive and healthy at the end of the 15 year guarantee period.

Why 15 years?

Our research has indicated bands of mortality for newly planted trees – the first three years see the biggest losses, principally through lack of watering and vandalism. Years 8-12 show another band of failure as trees typically exhaust inadequate soil volumes or suffer from compaction and anaerobic soil conditions. A tree growing well at 15 years has a very high chance of staying healthy for many further decades.

And if it fails?

We will supply a new tree of the same species to replace the tree, and replace any defective product used from our range with the equivalent current product.

How will it work for clients?

The client will specify and submit their drawings to **GreenBlue Urban** at the design stage, to verify that the tree pit design is in accordance with best practice. **GreenBlue Urban** will revise the drawings to ensure adequate soil volumes and drainage aeration and other details are correct.

GreenBlue Urban will then visit site to take account of the environment and open up a project record file for the tree. During installation, **GreenBlue Urban** will have a site engineer available to inspect key stages of the construction – these will be photographed and stored.

At planting completion, a **GreenBlue Urban** ArborAdvance 15 year warranty certificate will be issued to the client verifying that the tree has been planted in accordance with the drawings.

Maintenance watering as required must be carried out by the client or a chosen contractor, digitally photographed on each visit, and emailed to **GreenBlue Urban** for the record, for the first 2 years.

Additional watering may be requested in the event of exceptional drought conditions. **GreenBlue Urban** will visit the tree location on an annual basis until the 15 year period expires.

Warranty Exceptions

GreenBlue Urban will not be held liable for tree losses due to vandalism, vehicular damage or acts of God. In the event of a species specific disease we may reserve the right to replace the species with a more tolerant variety.



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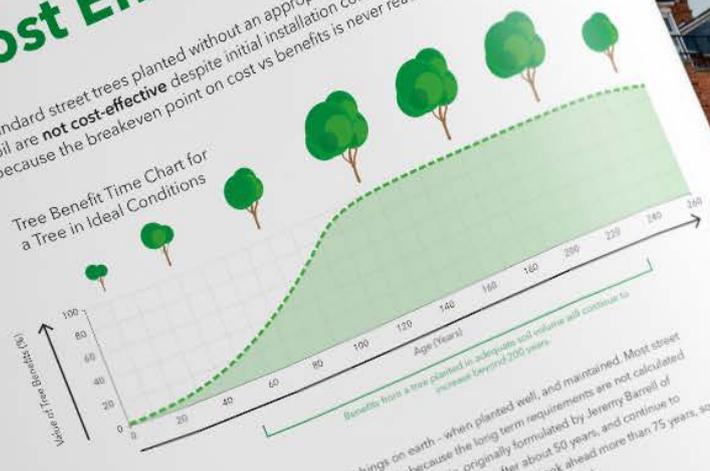
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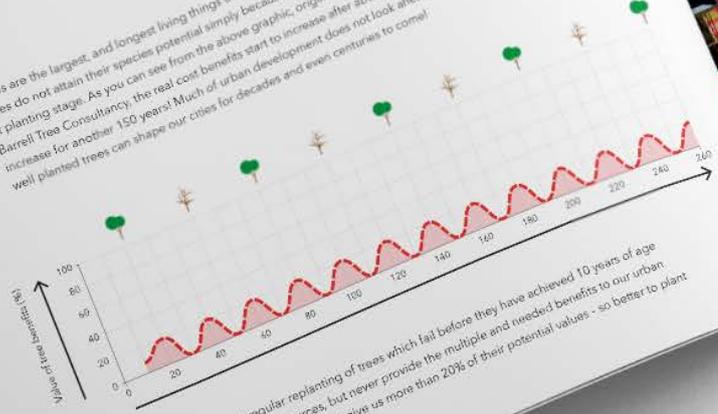
04. Cost Effectiveness

Standard street trees planted without an appropriate volume of uncompacted soil are **not cost-effective** despite initial installation costs being cheaper. This is because the breakeven point on cost vs benefits is never reached.

Tree Benefit Time Chart for a Tree in Ideal Conditions



01. Trees are the largest, and longest living things on earth - when planted well, and maintained. Most street trees do not attain their species potential simply because the long term requirements are not calculated at planting stage. As you can see from the above graphic, originally formulated by Jerry Barrrell of Barrrell Tree Consultancy, the real cost benefits start to increase after about 50 years, and continue to increase for another 150 years! Much of urban development does not look ahead more than 75 years, so well planted trees can shape our cities for decades and even centuries to come!



02. This image shows how regular replanting of trees which fail before they have achieved 10 years of age is not only a total waste of resources, but never provide the multiple and twofold benefits to our urban communities. Realistically, they will not give us more than 20% of their potential values - so better to plant one tree well, than 5 trees poorly!



Project Name
Mare Street

Location
Hackney, London, UK

Project Type
Streetscapes

Green Infrastructure Valuation

Not infrequently, we are asked questions related to the valuation of green infrastructure in projects. In this current economic climate, value for, and return on investment is of key importance.

No one will argue with the long term value of established tree planting – the principle difficulty however is that a building developer will be expected to invest in an asset which his company may not see significant financial return on, if they are selling the property immediately.

In our experience, developers are happy to invest in green infrastructure if it is a planning requirement and it does not put them at a commercial disadvantage. This highlights the importance of consistency in approach and insistence on standards such as minimum uncompacted soil volumes for trees by local planners.

The immediate gain for such development companies is in the increase of real estate values with well-designed quality landscape features and tree planting. On a phased housing development, poor planting detail will begin to manifest itself with stunted and dying trees even before the final phases are built. This will actually make properties more challenging to sell, as prospective purchasers will be negatively impacted by poor tree health in the estate.

The attention paid to tree pit design and the provision of an adequate tree root environment, in both volume and soil quality, is the true measure of a company's green credentials.

More recently we have seen new tools being developed to assess the value of green infrastructure, the best known being the 'I-Tree' software system. This tool can be used to value trees in terms of a wide spectrum of benefit – actually allowing land owners and local authorities to place an actual currency value on their tree stock.

This site can be accessed at www.itreetools.org and includes a wealth of information to assist in making a strong commercial case for investing planting trees as an investment.

Another system is the green infrastructure valuation toolkit – this can be accessed and downloaded from their website www.greeninfrastructurenw.co.uk

Our most recent publication, **Street Tree Cost Benefit Analysis**, uses research from Kenton Rogers of Treeconomics to compare the value of standard street tree planting vs. an engineered soil cell tree pit system. Available to download at www.greenblue.com/resources



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Frequently asked questions

Root Barriers

How deep should I install the root barrier?

This will depend on what you are trying to protect or achieve. As a general rule, don't direct roots deeper than you need to. For example, don't go 1m (3.3ft) deep to protect a pedestrian kerb structure where a 300mm (11.8") deep barrier would be sufficient.

How close to the tree can I install root barriers?

Always give the tree as much space as possible. For smaller species we can use small **RootDirectors** to manage roots downwards. If we are installing a barrier deeper than a **RootDirector** all around the tree then we need to take into consideration the tree's need for anchorage and access to soil nutrients.

If I'm protecting a service/utility, how deep in relation to that should I go with a root barrier?

We would normally suggest that a barrier extends to a depth of 2-300mm (11.8") below the invert level of the service or utility.

How close to the utility can I place the barrier?

The recommended distance is again about 300mm (11.8") away from the utility. This will ensure that any pressure against the root barrier is not transmitted directly to the service utility. The 300mm (11.8") is effectively a buffer zone.

Do you have any difficulty in getting utility companies to accept these products as a means of protecting their infrastructure?

Generally we find that if you can show that you have planned the tree planting design to incorporate protection for their utility, they have no difficulty. What they do not like is indiscriminate planting without regard to their investment. We do have on file some copies of letters from utilities approving the use of **ReRoot 2000** for protection of their installations.

What about NHBC and house builders, do they allow use of root barriers?

At present NHBC do not allow root barriers as a substitute for deep foundations for houses near trees although many house builders do incorporate these products.

Frequently asked questions

Root Barriers

How should I finish the top of the root barrier installation?

Any root barrier used must finish at least 10mm (0.4") above any planting medium (i.e. topsoil) on the tree side otherwise roots could grow over the top. This top edge can be incorporated in a pedestrian kerb detail or disguised by groundcover plants or suitable edging material. It does need protecting from traffic or mowers which could damage it.

Will the barrier rot or break down over time?

No, our barriers are resistant to biodegradation and photo degradation (light).

Do you use recycled plastic in your root barriers?

Yes, **RootDirectors** and **ReRoot** are made from recycled plastic and are in turn recyclable at the end of their life.

Can you use root barrier horizontally over service runs?

Yes, in some cases this is the only way trees can be planted near pipes. We recommend that the barrier forms a shallow arch over the service to ensure that it does not collect standing water but drains off both sides.

Can we then plant trees directly over the top of the service?

This would be for the utility company to decide if they would allow, but technically, providing there is sufficient depth of soil (Minimum 800mm (31.5")) over the root barrier there is no reason why not.

What will happen to a RootDirector when the tree within it outgrows its size?

Eventually the barrier could split but by then its purpose will be fulfilled as the root plate pattern will be established at a safe level.

When would you use the flexible linear ribbed root barrier instead of RootDirectors?

ReRoot 300/600/1000 are extremely versatile products and can be used in different ways. They allow the flexibility of working around underground obstacles and protrusions when trying to create tree pits in congested urban situations. They are also useful for grouping trees together in clusters rather than individual pits - giving the advantage of root space sharing for trees.



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Frequently asked questions

RootSpace & StrataCell - (Soil Cells)

What do Soil Cells do?

Soil Cells provide a load bearing structure beneath hard landscape areas, which we can load with quality topsoil for tree root systems without the fear of settlement leading to surface subsidence.

How do they work?

By protecting the soil from over compaction, Soil Cells are high strength, interlocking modules keeping weight off the soil, rather like a soil skeleton.

Have they got enough space for roots to develop within?

Yes - the void space ratio in **RootSpace** is 97% and in **StrataCell** 94.63%. The space between the support columns is large enough to allow roots to develop and thicken for long term stability and transport of moisture, nutrients and movement of plant sugars around the tree.

How do roots react to growing in these structures?

As the roots grow into the structure, they meet the support columns and either follow them around or divide. This produces a multiple rooting pattern which is very beneficial, particularly for trees in confined spaces. Graft unions may occur as roots rejoin around columns and proceed through the structure.

How do we know this occurs?

RootSpace was developed following research into the use of rock soil mixes which showed that even with a soil void ratio of only 18%, roots could proceed through the structure. What **RootSpace** does, is take the advantages of this system and further improve it by increasing the soil content dramatically. This removes the long term disadvantage of rock soil mixes which was the lack of void space for secondary thickening of the root system.

How do you assemble the structure?

Simple interlocking modules are linked together and assembled in the pit. The modules interlock both horizontally and vertically. The soil is then poured into the structure and lightly compacted either by treading or using a small plate compactor. The plate compactor simply rides across the **RootSpace**, vibrating the structure and allowing the soil to settle, eliminating large unwanted voids.

How long have Soil Cells been in use?

The first installations were successfully completed in 2001. The current **RootSpace** system has built on the experience gained and is a further improvement.

Frequently asked questions

Soil Cells

You are burying topsoil - isn't this a bit unnatural?

Yes, but to a degree, planting a tree in a city is unnatural for the tree which is still essentially a living forest plant. What we are doing here is creating a forest floor environment for the trees' benefit, but at a slightly lower level within the ground.

But how will the soil stay alive?

RootSpace should always be installed with adequate drainage and equally importantly with a root ventilation system such as the **GreenBlue Urban ArborVent** with two inlets. This will allow some air movement over the **RootSpace** lids to allow gaseous exchange to take place. This will allow the soil to breathe and live in the longer term.

Will the roots push the Cells apart?

In practice this doesn't happen due to the fact that a soil cell structure is normally installed at a depth of 300mm (11.8") below finished levels and the weight of granular sub base material above prevents surface heave occurring.

Can I use Soil Cells right against the root ball?

Best practice would be to allow the tree the maximum possible volume of unsupported topsoil against the root ball in the circumstances. The soil cells only need to start where their load bearing capability is required. This will allow for the tree's zone of rapid taper within the tree pit before entering the soil cell structure.

Do I need to load the cells with compactible soil mediums or similar load bearing soil mixes?

No - the soil cells need no additional strength from the soil so it is much better to load with premium sandy loam topsoil to BS3882.



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Frequently asked questions

RootSpace

How do I protect the top of the RootSpace from subsequent road base layers above?

GreenBlue Urban supply a twin wall geonet textile fabric to protect the top of the structure.

What about protecting the sides from sideways ground movement?

The sides of the **RootSpace** structure are faced with multiple columns giving good lateral support. Void spaces between the **RootSpace** structure and surrounding sub base should be filled with either further **RootSpace** and soil or the edge of the structure should be lined with geotextile and the reverse side be filled with a suitable compactable base material.

My tree pits are smaller than I would like to see - is it still worthwhile installing some RootSpace?

Yes. Many tree pits are smaller than we would like but the idea of the **RootSpace** is to maximise the value of the volume that you have got to the tree. Thus by providing optimum rooting conditions within your small tree pit you are giving the tree an excellent start in life and the vigour to grow out further in the long term.

What volume of RootSpace do you recommend?

The greater the volume you provide for the tree, the more the tree will succeed. Please consult our standard tree pit details for a good starting point. Obviously, the answer to this will be species dependent. Three cubic meters of rootable volume should be regarded as a minimum start although a mature tree root system will frequently occupy more than ten times this volume.

Do any species not tolerate this kind of tree pit?

We are not currently aware of any species which will not tolerate this kind of tree pit system.

How to order

When ordering please remember that we need the following:

1. Invoice address
2. Delivery address including POSTCODE
3. Name of person placing order
4. Order number if you use them
5. Telephone number for order queries
6. Site contact and number if applicable
7. Full payment unless established account holder

YOU CAN SEND YOUR ORDER BY:

UK:

POST to Northpoint, Compass Park, Bodiam, TN325BS

E-MAIL - enquiries@greenblueurban.com

PHONE our sales staff on 01580 830 800

NA:

POST: 71 Bysham Park Drive Woodstock, ON, N4T1P1

E-MAIL: inquiries@greenblue.com

PHONE: our sales staff on 1 866 282 2743

FIRST ORDERS & NEW ACCOUNTS

Payment is required with all first orders. A pro-forma invoice can be issued and faxed or e-mailed. The order will be released on receipt of payment.

FIRST ORDERS & NEW ACCOUNTS

Payment is required with all first orders. A pro-forma invoice can be issued through e-mail. The order will be released on receipt of payment.

LOCAL AUTHORITIES

An order number is usually sufficient to commence trading with payment of accounts due 30 days nett as per our normal conditions of sale.

DELIVERY

Schedules of delivery are estimates only. We will use our best efforts to deliver at times stated but shall not

be liable for any delays due to causes beyond our control. Goods shall be deemed to be delivered once handed over to the carrier.

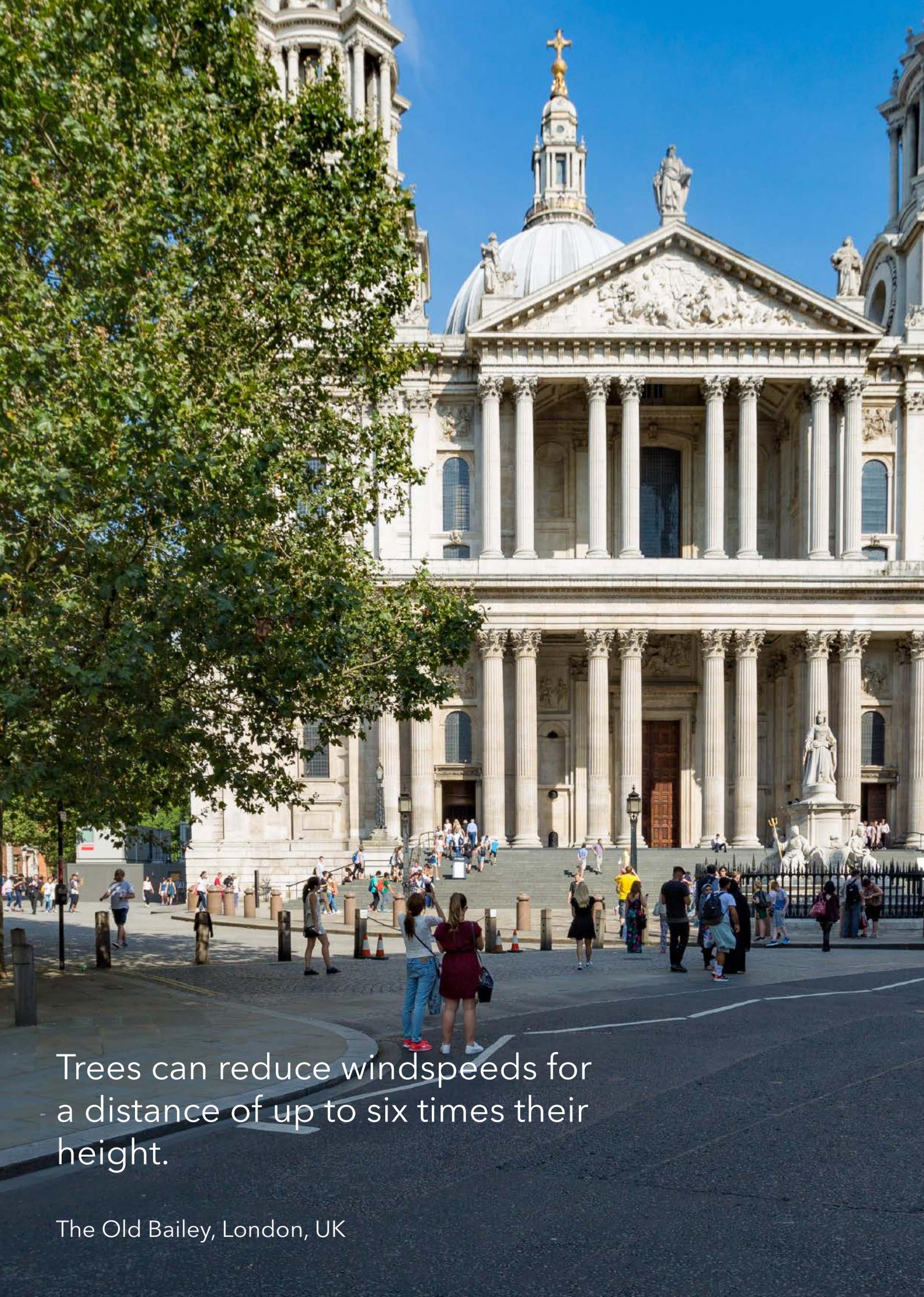
PAYMENT

Full payment is due 30 days after the date of the invoice.

DISCLAIMER

Trees are living organisms whose growth cannot always be predicted. Accordingly, **GreenBlue Urban** makes no warranties on its products either expressed or implied concerning the effects of the products on tree root growth, their merchantability or fitness for a particular purpose. **GreenBlue Urban** recommends that an arborist with knowledge of local conditions be consulted.





Trees can reduce windspeeds for a distance of up to six times their height.

The Old Bailey, London, UK

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Wembley Stadium, London, UK

Product data sheet

ReRoot 300/600/1000 ribbed root barrier**MATERIAL CHARACTERISTICS**

PROPERTIES	ISO	VALUE
PHYSICAL		
Density	g/cc	0.97
Shrinkage ²	%	2.5 – 3.0
Melt Flow (190°C/5kg)	g/10min	< 0.8
MECHANICAL		
Izod Impact, notched,	kJ/m ²	> 13 > 10
Stress at yield	MPa	23-26
Stress at break	MPa	28-30
Strain at break	%	> 600
Flexular Modulus	MPa	950 – 1100
Shore D hardness		60-63
THERMAL		
VST@10N (VST/A)	%	115-130
HDT@0.45MPa (HDT/B)	°C	73-80

TYPE

Ribbed

CODE

RER300A, RER600A & RER1000A

SIZE

Thickness:	1mm	
Width:	RER300A	300mm
	RER600A	600mm
	RER1000A	1000mm

ROLL SIZE

30M

MATERIAL

HDPE

FINISH

Natural

COLOUR

Black

WEIGHT

RER300A	0.3 kg per linear metre
RER600A	0.6 kg per linear metre
RER1000A	1.0 kg per linear metre

Product data sheet

ReRoot 2000 / RootStop (1mm thick) high strength root barrier

TYPE

Flat

CODE

RER210X0.3A
RER210X0.6A
RER210X1.0A
RER210X1.5A

SIZE

Thickness: 1mm
Width: RER210X0.6A 600mm
RER210X1.0A 1000mm
RER210X1.5A 1500mm

ROLL SIZE

100LM

MATERIAL

Recycled HDPE

FINISH

Natural

COLOUR

Black

WEIGHT

1.0kg per m²

MATERIAL CHARACTERISTICS

PROPERTIES	ISO	VALUE
------------	-----	-------

PHYSICAL

Density	g/cc	0.97
Shrinkage ²	%	2.5 - 3.0
Melt Flow (190°C/5kg)	g/10min	< 0.8

MECHANICAL

Izod Impact, notched,	kJ/m ²	> 13 > 10
Stress at yield	MPa	23-26
Stress at break	MPa	28-30
Strain at break	%	> 600
Flexular Modulus	MPa	950 - 1100
Shore D hardness		60-63

THERMAL

VST@10N (VST/A)	%	115-130
HDT@0.45MPa (HDT/B)	°C	73-80

Product data sheet

ReRoot 2000 / RootStop (2mm thick) high strength root barrier

MATERIAL CHARACTERISTICS

PROPERTIES	ISO	VALUE
PHYSICAL		
Density	g/cc	0.97
Shrinkage ²	%	2.5 - 3.0
Melt Flow (190°C/5kg)	g/10min	< 0.8
MECHANICAL		
Izod Impact, notched,	kJ/m ²	> 13 > 10
Stress at yield	MPa	23-26
Stress at break	MPa	28-30
Strain at break	%	> 600
Flexular Modulus	MPa	950 - 1100
Shore D hardness		60-63
THERMAL		
VST@10N (VST/A)	%	115-130
HDT@0.45MPa (HDT/B)	°C	73-80

TYPE

Flat

CODE

RER220X1.0A
RER220X1.5A
RER220X2.0A

SIZE

Thickness:	1mm	
Width:	RER220X1.0A	1000mm
	RER220X1.5A	1500mm
	RER220X2.0A	2000mm

ROLL SIZE

100LM

MATERIAL

Recycled HDPE

FINISH

Natural

COLOUR

Black

WEIGHT

2.0kg per m²

Product data sheet

RD510A RootDirector

TYPE

Tapered and ribbed to suit root-ball up to 375mm diameter

CODE

RD510A

MATERIAL

Recycled HDPE

MATERIAL CHARACTERISTICS

Density: 0.935

FINISH

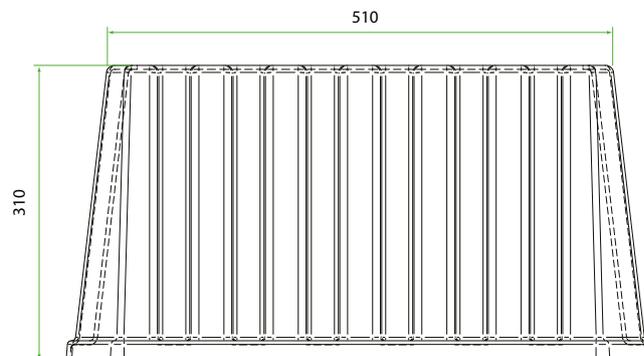
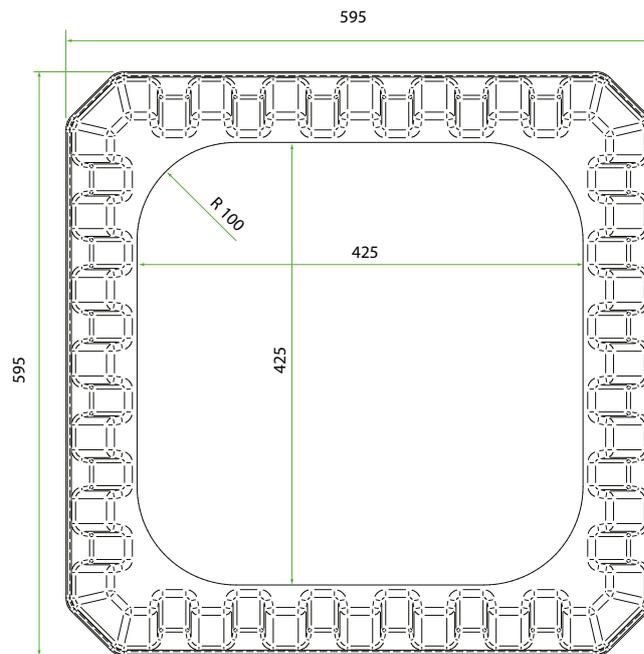
Natural

COLOUR

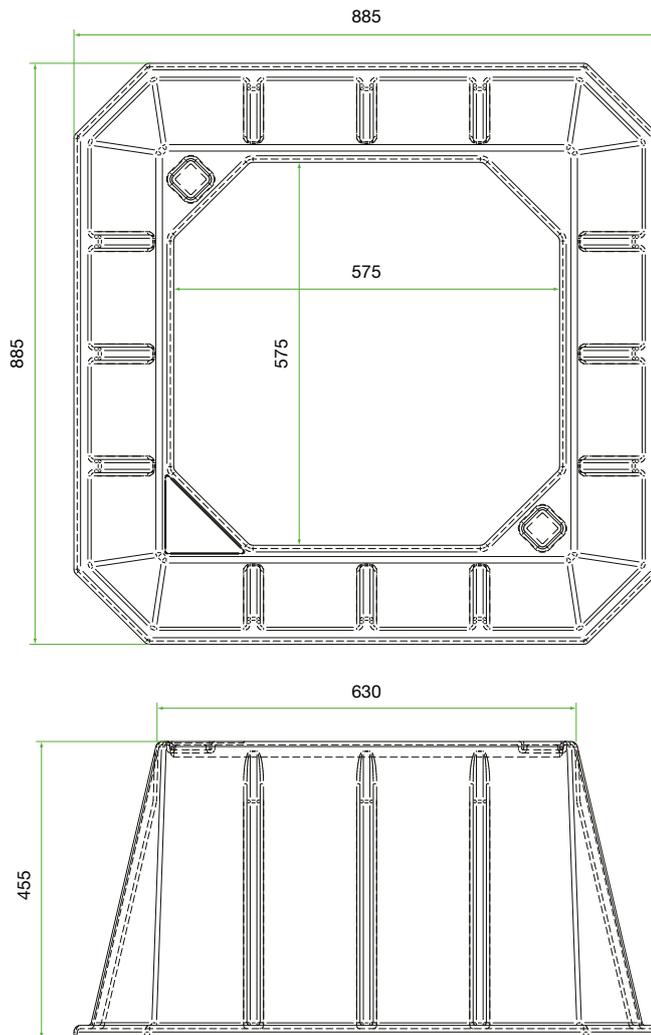
Black

WEIGHT

3.4kg



Product data sheet RD640A RootDirector



TYPE

Tapered and ribbed to suit root-ball up to 525mm diameter

CODE

RD640A

MATERIAL

Recycled HDPE

MATERIAL CHARACTERISTICS

Density: 0.935

FINISH

Natural

COLOUR

Black

WEIGHT

7.2kg

Product data sheet

RD1050A RootDirector

TYPE

Tapered and ribbed to suit root-ball up to 810mm diameter

CODE

RD1050A

MATERIAL

Recycled HDPE

MATERIAL CHARACTERISTICS

Density: 0.935

FINISH

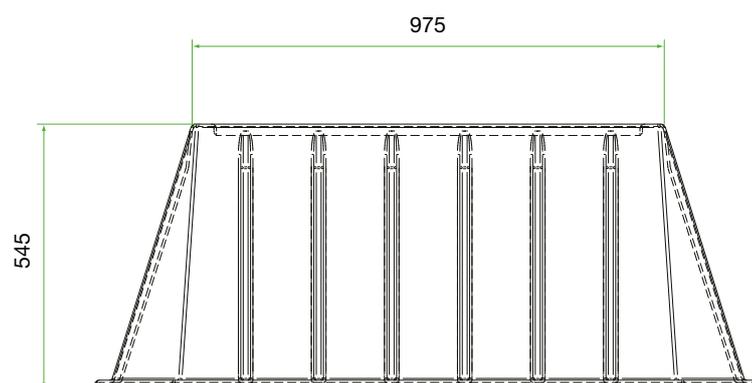
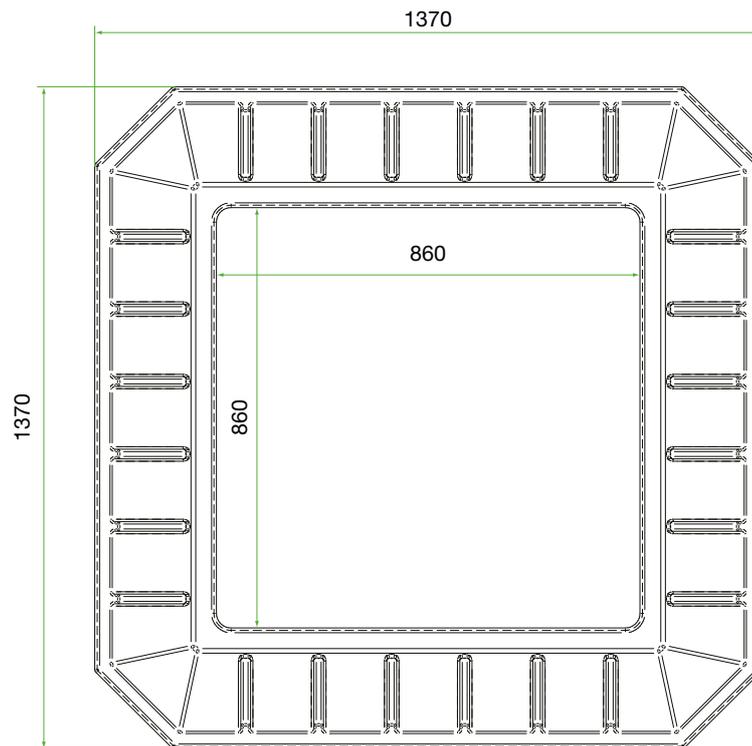
Natural

COLOUR

Black

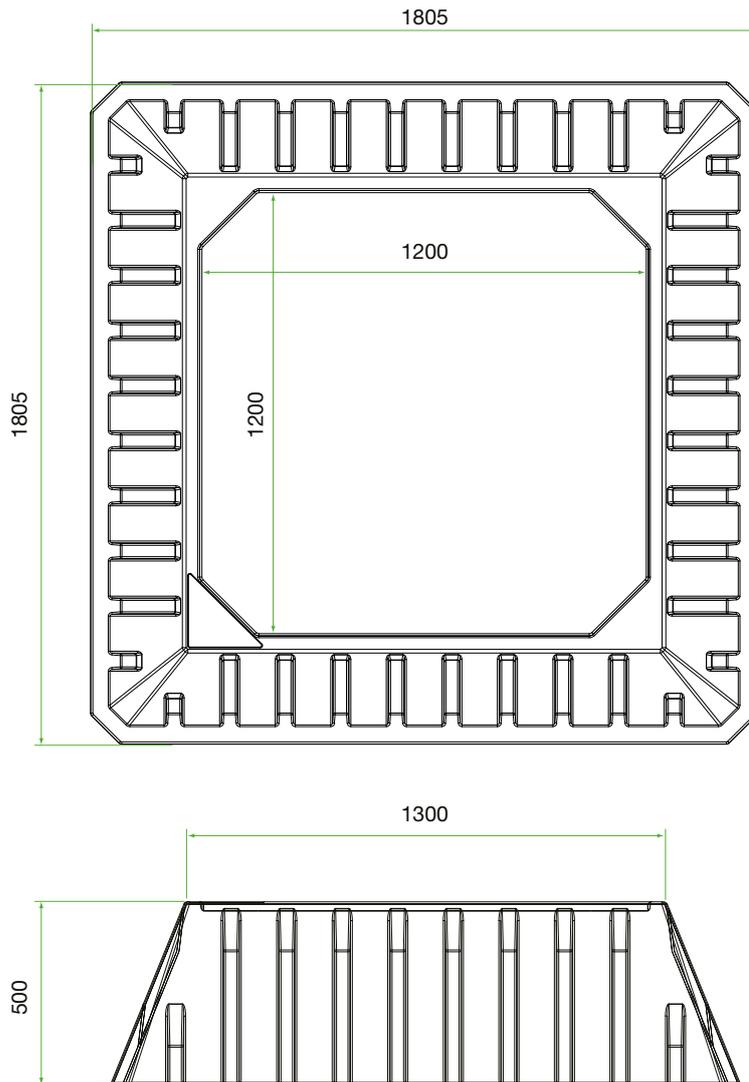
WEIGHT

13.1kg



Product data sheet

RD1400A RootDirector



TYPE

Tapered and ribbed to suit root-ball up to 1150mm diameter

CODE

RD1400A

MATERIAL

Recycled HDPE

MATERIAL CHARACTERISTICS

Density: 0.935

FINISH

Natural

COLOUR

Black

WEIGHT

16.5kg



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Product data sheet

RD1000-RSA RootDirector

TYPE

Tapered and ribbed to suit root-ball up to 750mm diameter

CODE

RD 1000-RSA

MATERIAL

Recycled HDPE

MATERIAL CHARACTERISTICS

Density: 0.935

FINISH

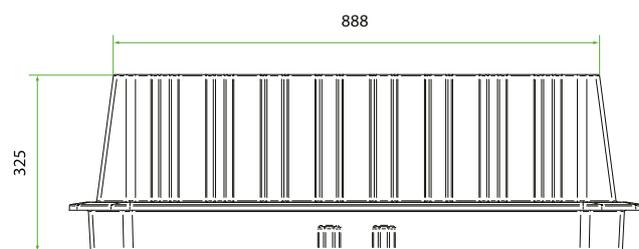
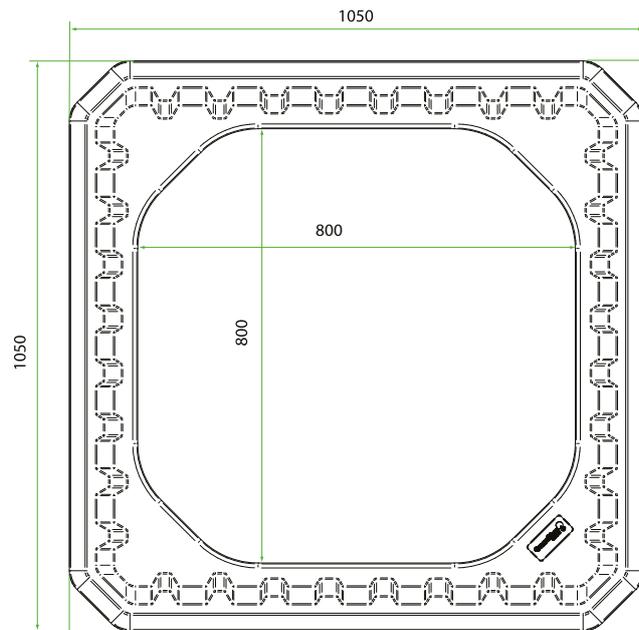
Natural

COLOUR

Black

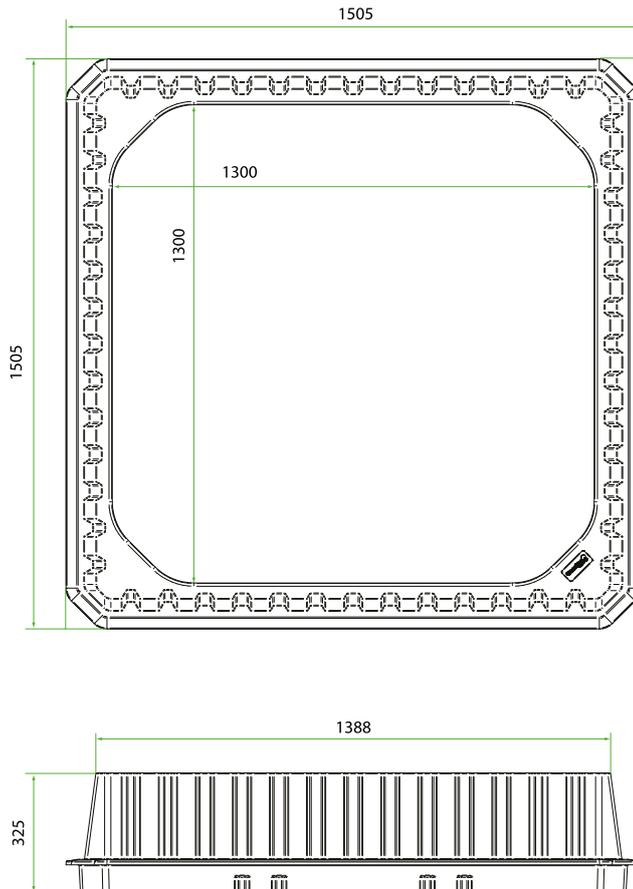
WEIGHT

3.4kg



Product data sheet

RD1500-RSA RootDirector



TYPE

Tapered and ribbed to suit root-ball up to 1250mm diameter

CODE

RD 1500-RSA

MATERIAL

Recycled HDPE

MATERIAL CHARACTERISTICS

Density: 0.935

FINISH

Natural

COLOUR

Black

WEIGHT

7.2kg

Product data sheet

RootForm

TYPE

Modular construction. 300mm and 500mm standard sections allow for 1000, 1200, 1500, 1800 openings and beyond

CODE TYPE

RF4-30A	Straight
RF4-50A	Straight
RF4-CRA	Corner

MATERIAL

Recycled HDPE

DIMENSIONS

RF4-30A	W 300 x D 400mm
RF4-50A	W 500 x D 400mm
RF4-CRA	W 445 x D 400mm

FINISH

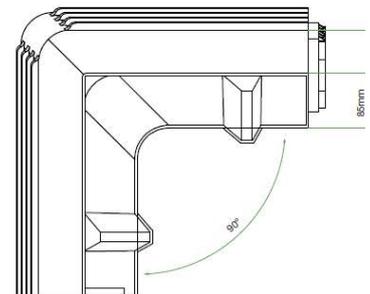
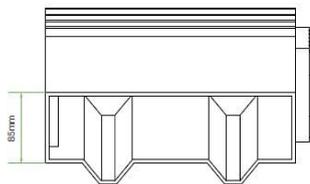
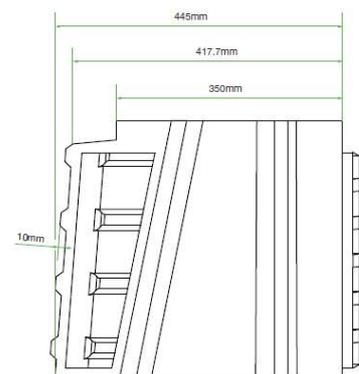
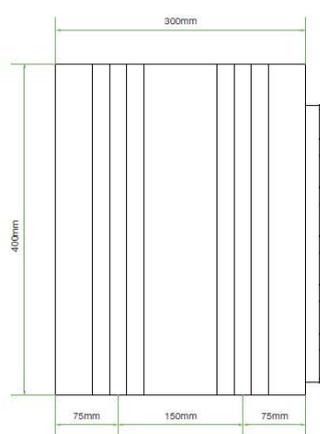
Natural

COLOUR

Black

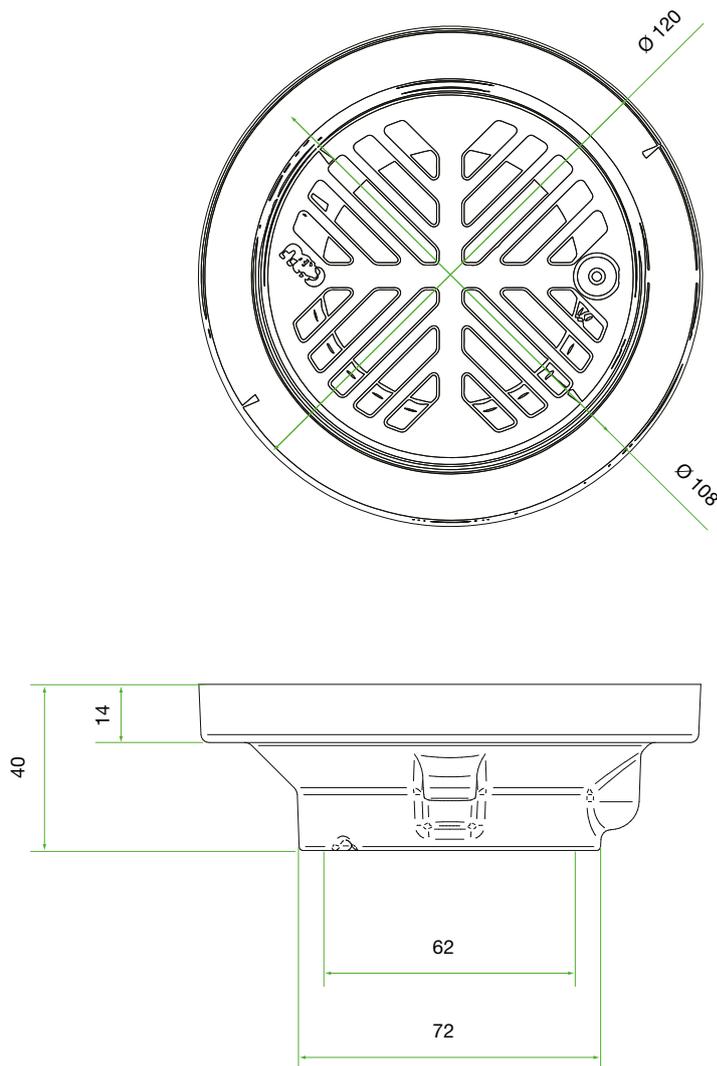
WEIGHT

RF4-30A	1.84kg
RF4-50A	2.93kg
RF4-CRA	3.32kg



Product data sheet

RootRain Hydrogrille



TYPE

Irrigation/aeration system with 60mm diameter perforated pipe and 120mm diameter aluminium inlet

CODE	PIPE LENGTH	INLET
RRHYDR1A	3.0m	Single
RRHYDR2A	5.0m	Single
RRHYDR3A	8.0m	Single
RRHYDRDI3A	8.0m	Double

MATERIAL

Body LM6 aluminium, lid 5086 aluminium, pipe polypropylene, tee recycled HDPE

FINISH

Body cast with finished top edge, lid anodised

COLOUR

Body and lid natural aluminium, pipe and tee black

WEIGHT

RRHYDR1A	1.18kg
RRHYDR2A	1.56kg
RRHYDR3A	2.13kg
RRHYDRDI3A	2.73kg

Product data sheet

RootRain Metro with Plastic Cap

TYPE

35mm diameter irrigation system

CODE

PIPE LENGTH

RR1A	1.25m
RR2A	1.75m
RR3A	2.50m

MATERIAL

Bracket recycled HDPE, pipe polypropylene

FLOW

60 litres a minute in porous soils

FINISH

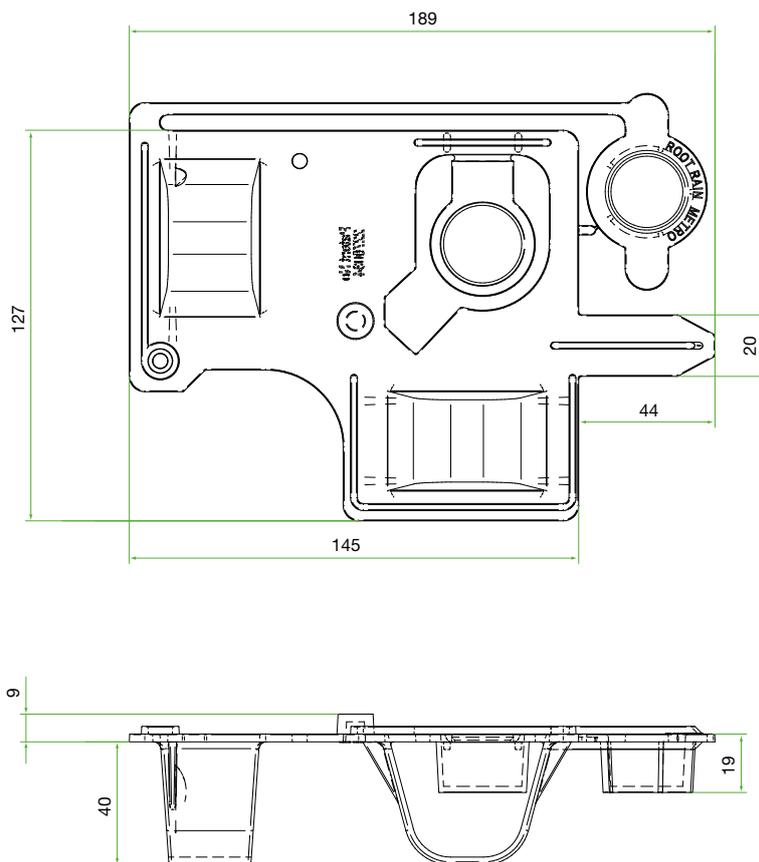
Body cast with finished top edge, lid anodised

COLOUR

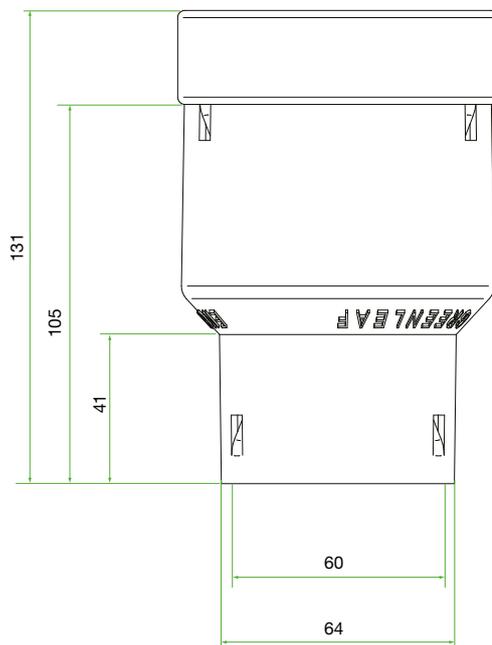
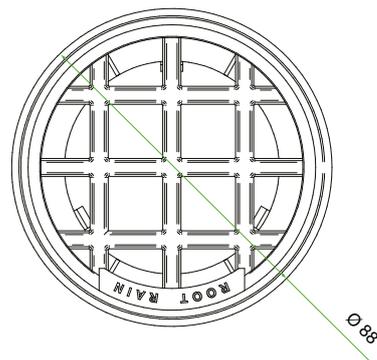
Bracket green, pipe black

WEIGHT

RR1A	0.20kg
RR2A	0.25kg
RR3A	0.31kg



Product data sheet RootRain Urban



TYPE

60mm diameter irrigation system with 80mm diameter fixed plastic grid inlet.

CODE PIPE LENGTH

RRURB1A	3.0m
RRURB2A	5.0m
RRURB3A	8.0m

MATERIAL

Recycled HDPE inlet and tee, polypropylene pipe.

FINISH

Natural

COLOUR

Black

WEIGHT

RRURB1A	0.9kg
RRURB2A	1.3kg
RRURB3A	1.9kg

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GreenBlue
URBAN 

Product data sheet

RootRain Civic

TYPE

Irrigation/aeration system with 60mm diameter perforated pipe and 95mm diameter aluminium cap, with retainer chain.

CODE	PIPE LENGTH
------	-------------

RRCIVIC1A	3.0m
RRCIVIC2A	5.0m
RRCIVIC3A	8.0m

MATERIAL

Aluminium cap, inlet pipe and tee HDPE

FINISH

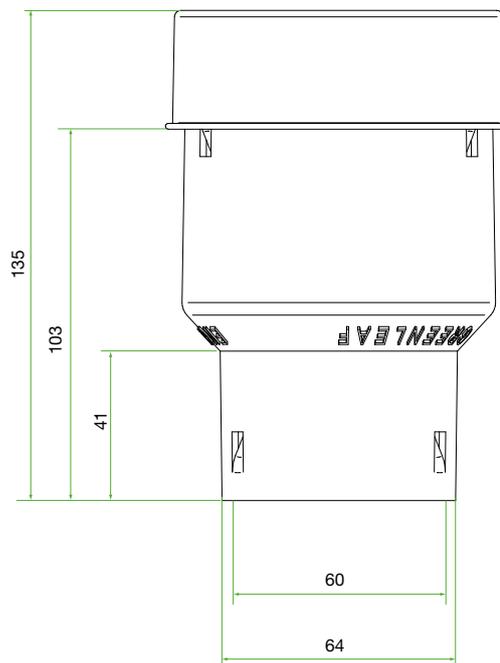
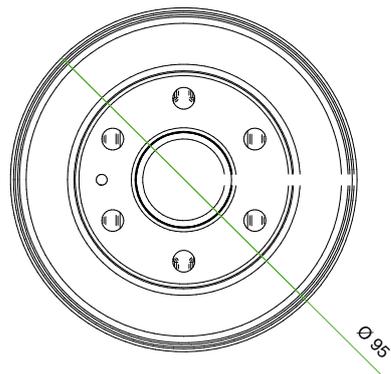
Polyester powder coated cap remainder natural

COLOUR

Black

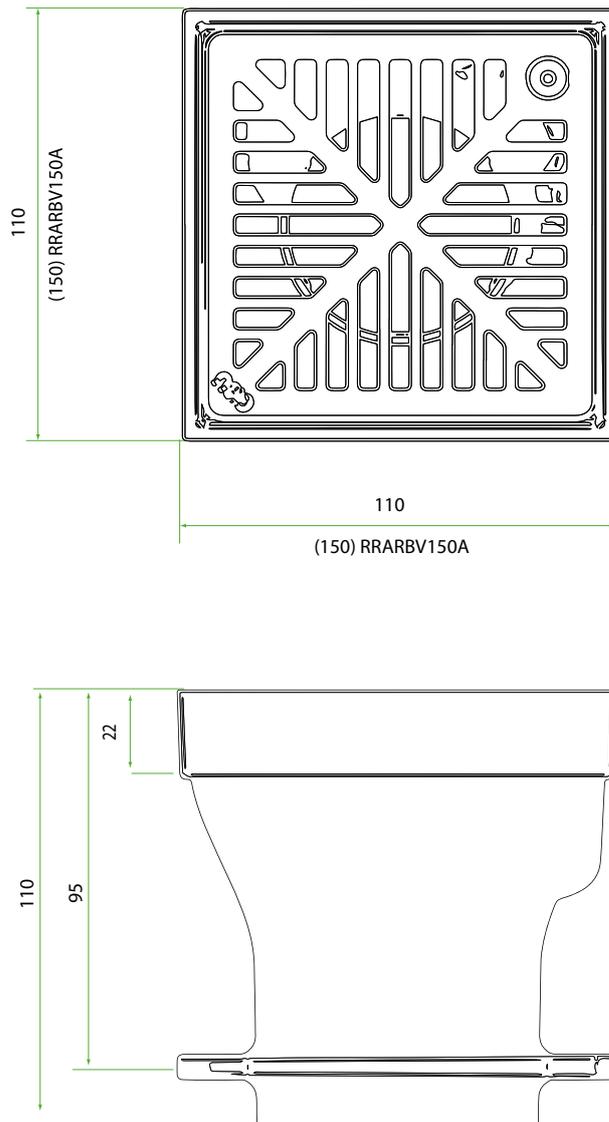
WEIGHT

RRCIVIC1A	1.0kg
RRCIVIC2A	1.4kg
RRCIVIC3A	2.0kg



Product data sheet

RootRain ArborVent



TYPE

Irrigation/aeration system with 60mm diameter perforated pipe and 100mm x 100mm aluminium inlet.

CODE	PIPE LENGTH	INLET
RRARBV1D	3.0m	Single
RRARBV2D	5.0m	Single
RRARBV3D	8.0m	Single
RRARBVD13D	8.0m	Double
RRARBV150A		

MATERIAL

Body LM6 aluminium, lid 5086 aluminium, pipe polypropylene, tee recycled HDPE

FINISH

Body cast with finished top edge, lid anodised

COLOUR

Body and lid natural aluminium, pipe and tee black

WEIGHT

RRARBV1D	1.08kg
RRARBV2D	1.46kg
RRARBV3D	2.03kg
RRARBVD13D	4.06kg
RRARBV150A	1.6kg

Product data sheet

StrataCell 30/60

TYPE

Large load-bearing soil support module

CODE	SIZE (M ²)	DESCRIPTION
GBUSC301A	1.0m ²	StrataCell 30 (1 Deep)
GBUSC302A	1.0m ²	StrataCell 30 (2 Deep)
GBUSC303A	1.0m ²	StrataCell 30 (3 Deep)
GBUSC304A	1.0m ²	StrataCell 30 (4 Deep)
GBUSC601A	1.0m ²	StrataCell 60 (1 Deep)
GBUSC602A	1.0m ²	StrataCell 60 (2 Deep)
GBUSC603A	1.0m ²	StrataCell 60 (3 Deep)
GBUSC604A	1.0m ²	StrataCell 60 (4 Deep)

MATERIAL

GLSCM60A - Recycled glass reinforced polypropylene

GLSCM30A recycled polypropylene

LOAD BEARING CAPACITY

GLSCM60A 550kPa vertical load

GLSCM30A 260kPa vertical load

FINISH

Natural

COLOUR

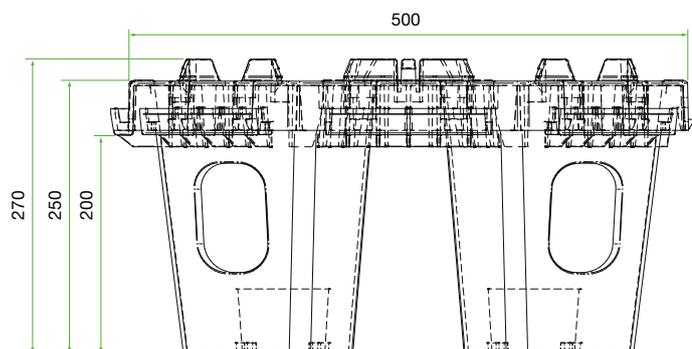
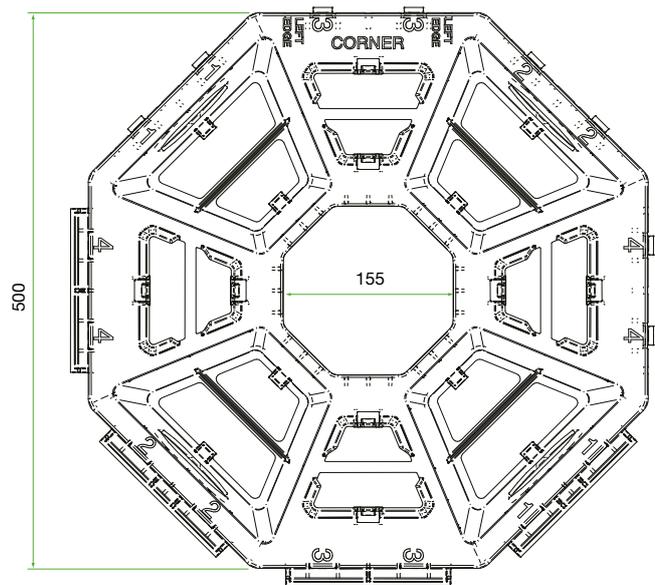
Black

WEIGHT

3.86kgs

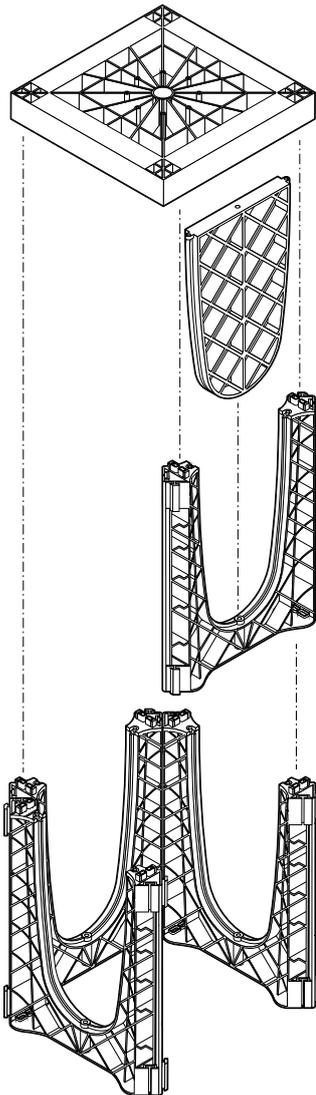
VOID SOIL

94%



Product data sheet

RootSpace 400/600



TYPE

Large load-bearing soil support module

CODE	SIZE (M ²)	DESCRIPTION
GBURS61A	1.0m ²	RootSpace 600 1 deep
GBURS611A	1.0m ²	RootSpace 600 1 deep with Infills
GBURS62A	1.0m ²	RootSpace 600 2 deep
GBURS621A	1.0m ²	RootSpace 600 2 deep with Infills
GBURS41A	1.0m ²	RootSpace 400 1 deep
GBURS411A	1.0m ²	RootSpace 400 1 deep with Infills
GBURS42A	1.0m ²	RootSpace 400 2 deep
GBURS421A	1.0m ²	RootSpace 400 2 deep with Infills

MATERIAL

Recycled polypropylene

LOAD BEARING CAPACITY

RootSpace 600
RootSpace 400

FINISH

Natural

COLOUR

Black

WEIGHT

Dependant on exact configuration

VOID SOIL

97%

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www.greenblue.com

Sales and Service:
 +44 (0) 1580 830 800
 1 866 282 2743

GreenBlue
URBAN 

E-mail:
 enquiries@greenblueurban.com
 inquiries@greenblue.com

Product data sheet

Adur DTS Tree Grille

TYPE

Adur

CODE SIZE

ADUR10A	1000 x 1000mm
ADUR12A	1200 x 1200mm
ADUR15A	1500 x 1500mm

MATERIAL

Segments:	Ductile iron
Frame:	Mild steel
Fixings:	Galvanized

LOAD BEARING CAPACITY

Maximum 5 tonne wheel load

FINISH

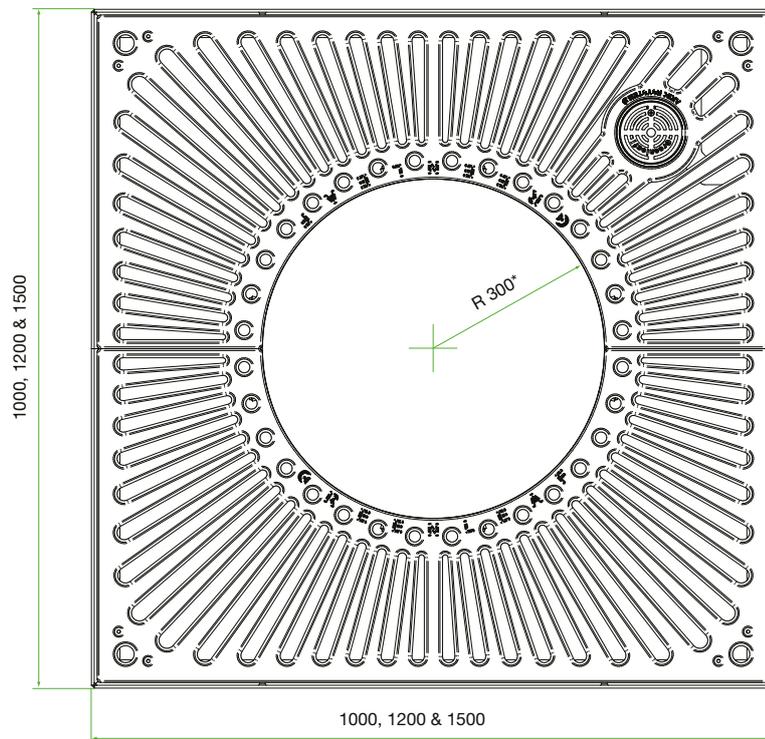
Segments:	Zinc rich primer with polyester powder top coat to DIN EN ISO 12944-2
Frame:	Galvanized to BS EN 146 1999

COLOUR

Segments:	RAL 9005 Satin. Other RAL colours available to special order
-----------	--

WEIGHT

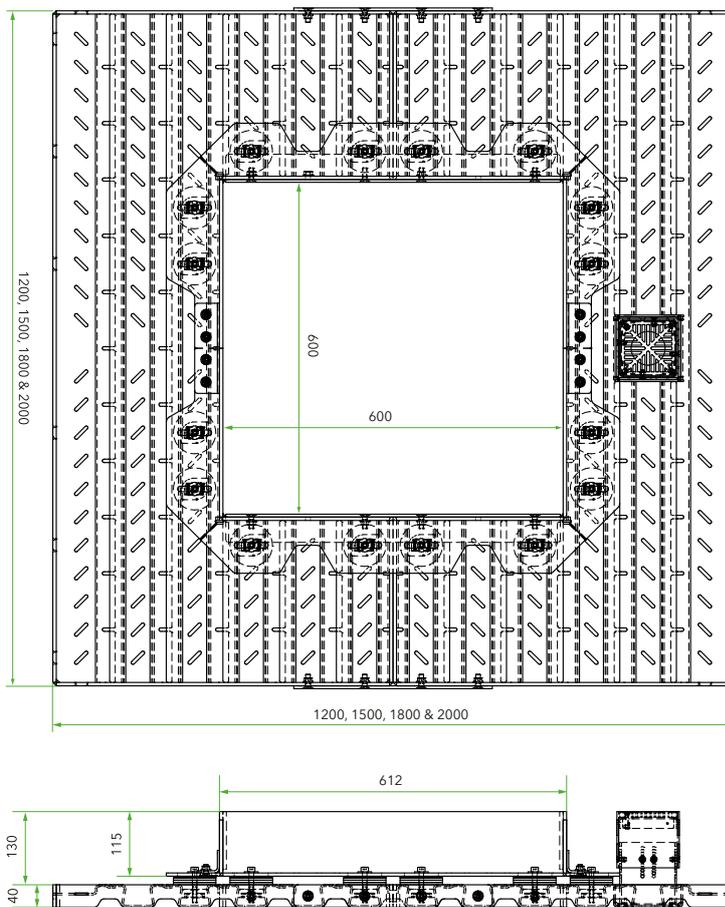
ADUR12B	105kg
Other sizes	TBA



*Note: 1000 grille has a centre radius of 250

Product data sheet

Zeta Tree Grille



TYPE

ZETA

CODE

SIZE

ZETA10A	1000 x 1000mm
ZETA12A	1200 x 1200mm
ZETA15A	1500 x 1500mm
ZETA18A	1800 x 1800mm
ZETA20A	2000 x 2000mm

MATERIAL

Galvanised Steel

LOAD BEARING CAPACITY

Maximum 5 tonne wheel load

FINISH

Segments & Galvanised
frame: BS EN ISO 1461

COLOUR

Galvanised Steel

Product data sheet

Avon DTS Tree Grille

TYPE

Avon

CODE SIZE

AVON10B	1000 x 1000mm
AVON12B	1200 x 1200mm
AVON15A	1500 x 1500mm

MATERIAL

Segments:	Ductile iron
Frame:	Mild steel
Fixings:	Galvanized

LOAD BEARING CAPACITY

Maximum 5 tonne wheel load

FINISH

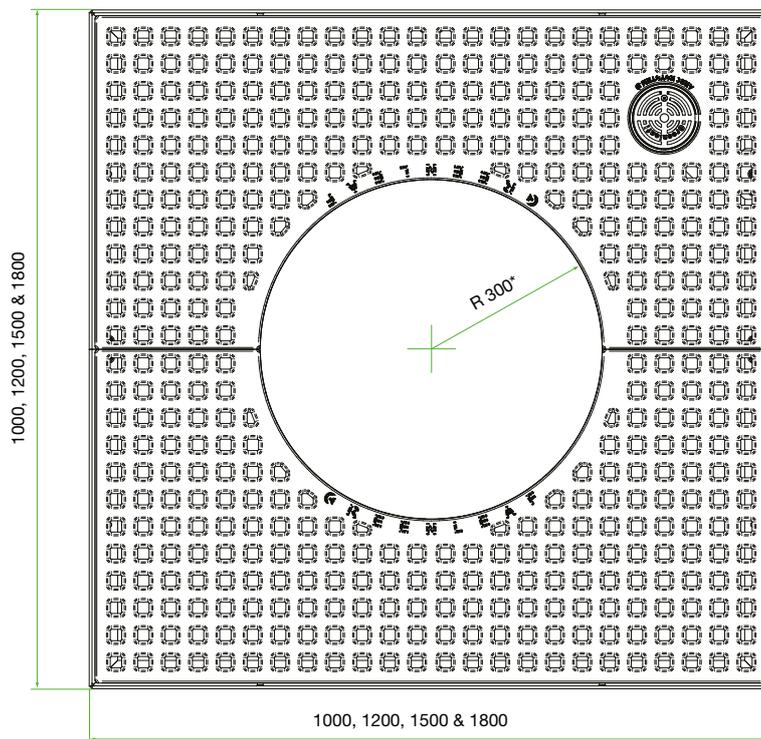
Segments:	Zinc rich primer with polyester powder top coat to DIN EN ISO 12944-2
Frame:	Galvanized to BS EN 146 1999

COLOUR

Segments:	RAL 9005 Satin. Other RAL colours available to special order
-----------	---

WEIGHT

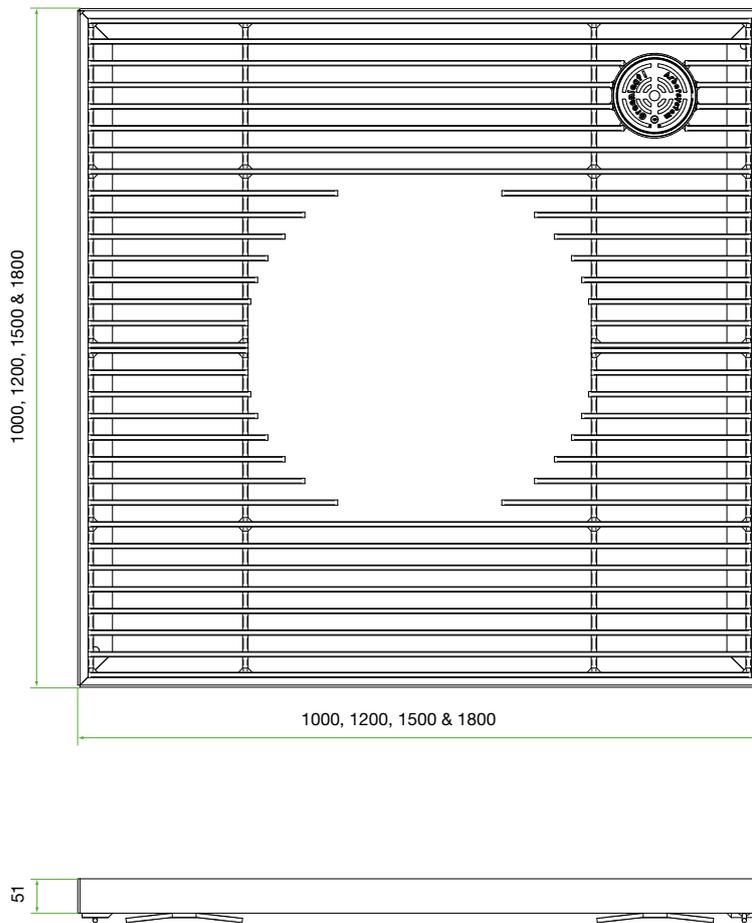
AVON10B	82kg
AVON12B	123kg
AVON15A	181kg



*Note: 1000 grille has a centre radius of 250

Product data sheet

Clyde Steel Tree Grille



Note: Centre radius varies depending on outside dimensions

TYPE

Clyde

CODE SIZE

CLYDE10GB	1000 x 1000mm
CLYDE12GB	1200 x 1200mm
CLYDE15GA	1500 x 1500mm

Larger sizes available upon request

MATERIAL

Segments:	Galvanised steel
Frame:	Mild steel
Fixings:	Satinless steel

LOAD BEARING CAPACITY

Light vehicle overrun

FINISH

Segments and frame galvanised to BS EN 146 1999

COLOUR

Galvanized, powder coated to DIN EN ISO 12944-2 in any RAL colour to special order

Product data sheet

Tay Tree Grille

TYPE

Tay

CODE SIZE

TAY10B	1000 x 1000mm
TAY12B	1200 x 1200mm
TAY15B	1500 x 1500mm

MATERIAL

Segments:	Ductile iron
Frame:	Mild steel
Fixings:	Galvanized

LOAD BEARING CAPACITY

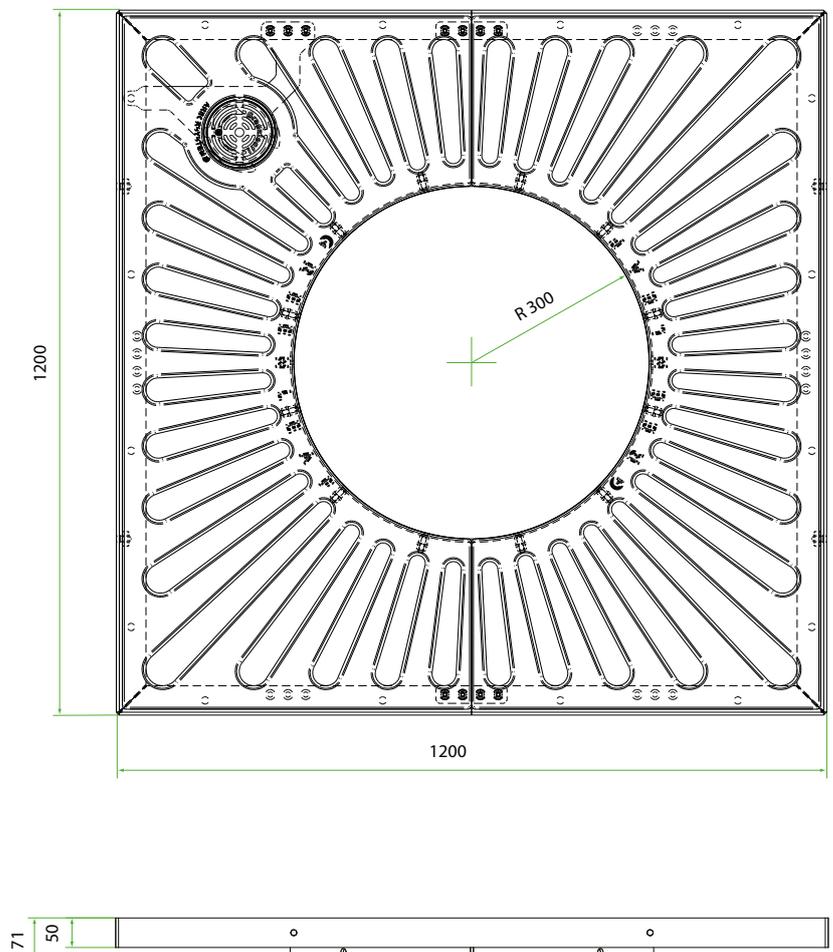
Maximum 5 tonne wheel load

FINISH

Segments & Frame:	Zinc rich primer with polyester powder top coat to DIN EN ISO 12944-2
----------------------	---

COLOUR

Segments:	RAL 9005 Black
-----------	----------------



Product data sheet

Castle Recessed Tree Grille

TYPE

Castle

CODE SIZE

CASTLE12A	1.2 x 1.2m single tray
CASTLE12B	1.2 x 1.2m double tray
CASTLE15A	1.5 x 1.5m double tray
CASTLE15B	1.5 x 1.5m double tray
CASTLE18A	1.8 x 1.8m double tray
CASTLE20A	2.0 x 2.0m double tray
CASTLE24A	2.4 x 2.4m double tray

MATERIAL

Segments:	Mild steel
Frame:	Mild steel
Fixings:	Stainless steel

LOAD BEARING CAPACITY

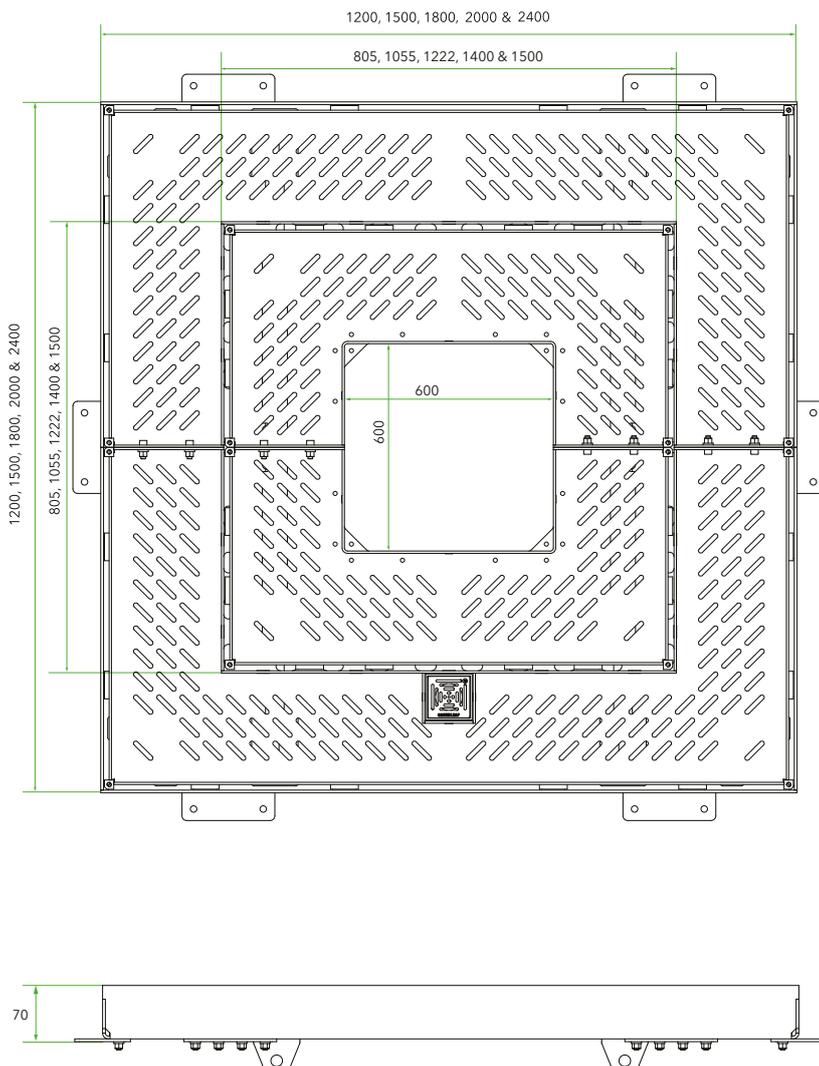
Manufactured to meet required wheel loadings.

FINISH

Segments and Frame:
Galvanized to BSEN 146 1999

COLOUR

Galvanized



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 1 866 282 2743

E-mail:
 enquiries@greenblueurban.com
 inquiries@greenblue.com

Product data sheet

Precast SettStone Tree Grille

TYPE

SettStone

CODE SIZE

SSPC12UGA 1200 x 1200mm

MATERIAL

Segments: Precast stone
Frame: Mild steel
Fixings: Stainless steel

LOAD BEARING CAPACITY

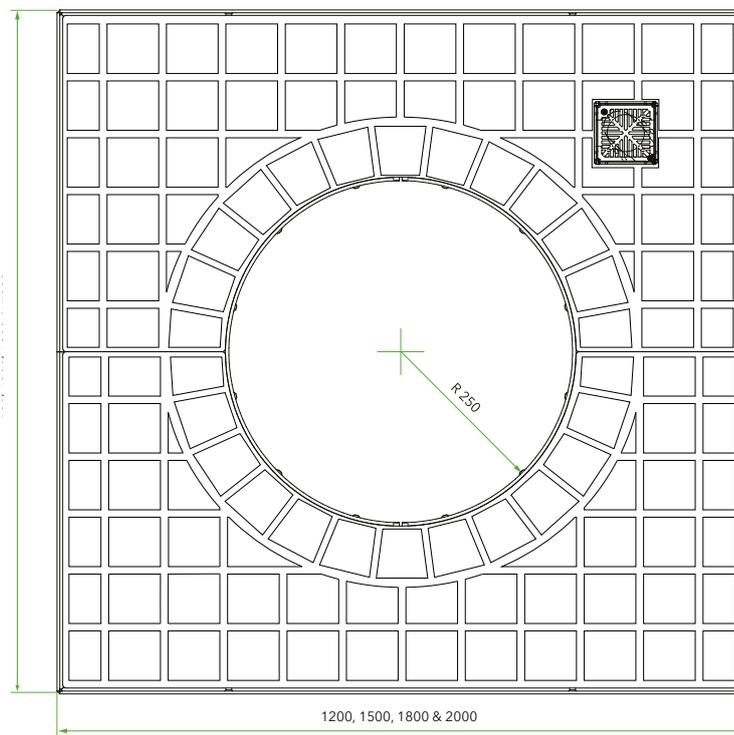
Manufactured to meet required wheel loadings.

FINISH

Segments and Frame:
Natural stone
Galvanized to BSEN 146 1999

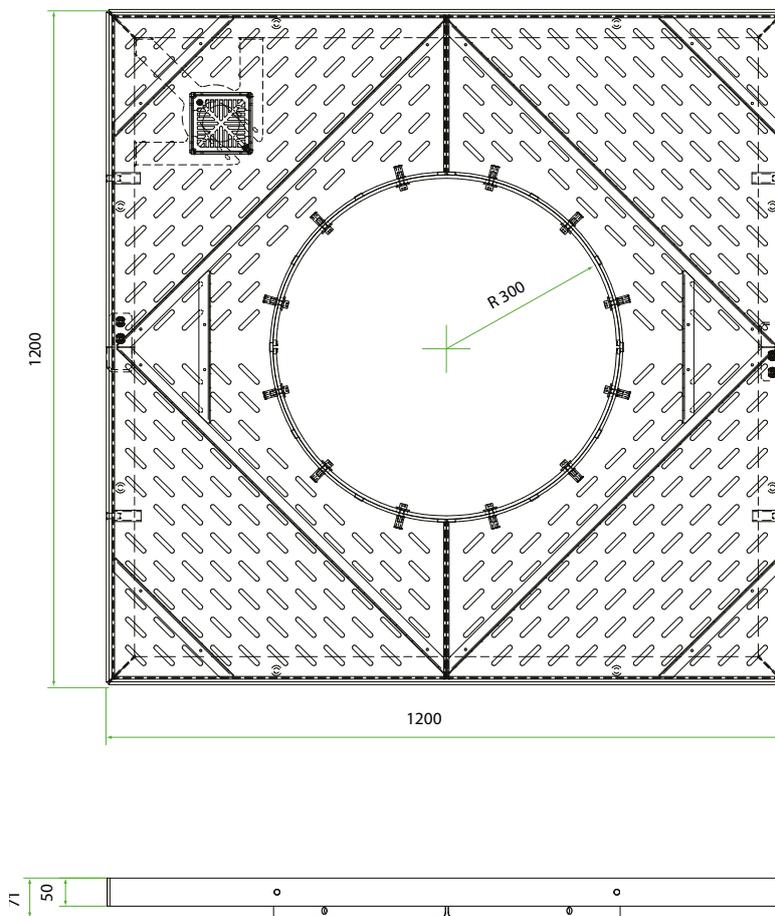
COLOUR

Urban Grey



Product data sheet

Precast ArboResin Tree Grille



TYPE

Precast ArboResin

CODE SIZE

ARBPC12A	1200 x 1200 mm
ARBPC12B	1200 x 1200 mm
ARBPC15A	1500 x 1500 mm
ARBPC15B	1500 x 1500 mm

CODE FINISH

ARBPC12A	Brittany Bronze
ARBPC12B	Silver Grey
ARBPC15A	Brittany Bronze
ARBPC15B	Silver Grey

MATERIAL

Segments:	Steel and ArboResin
Frame:	Mild steel
Fixings:	Stainless steel

LOAD BEARING CAPACITY

Light vehicle overrun only

FINISH

Segments:	Various stones
Frame:	Galvanized

COLOUR

A large selection of colours available to special order

Product data sheet

Coniston Tree Guard

TYPE

Coniston

CODE

SIZE

CONIS5A	1800 x 500mm dia
CONIS6A	1800 x 600mm dia

MATERIAL

Mild steel

FINISH

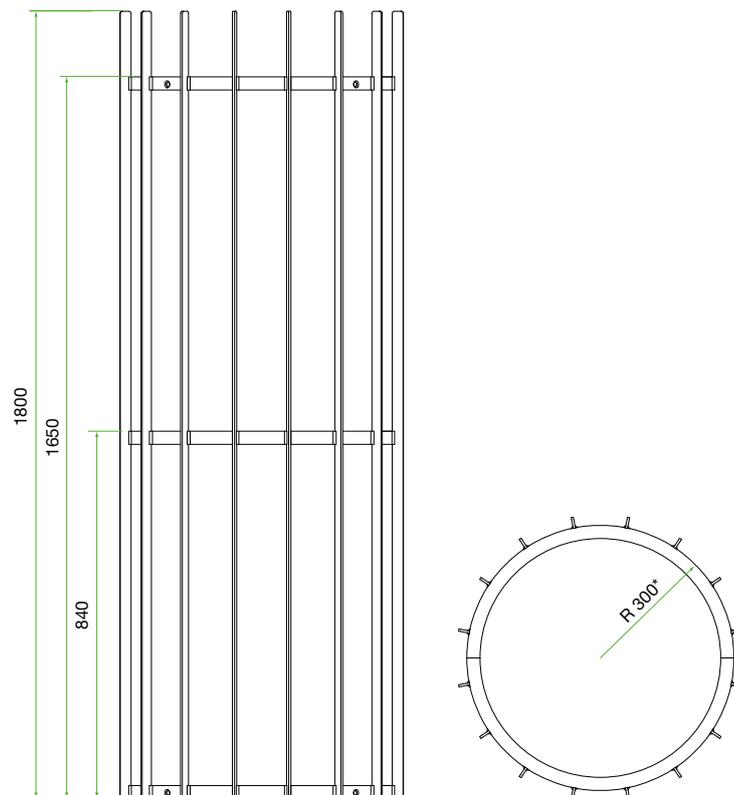
Zinc rich primer with polyester powder top coat to DIN EN ISO 12944-2

COLOUR

RAL 9005 Satin. Other RAL colours available to special order

WEIGHT

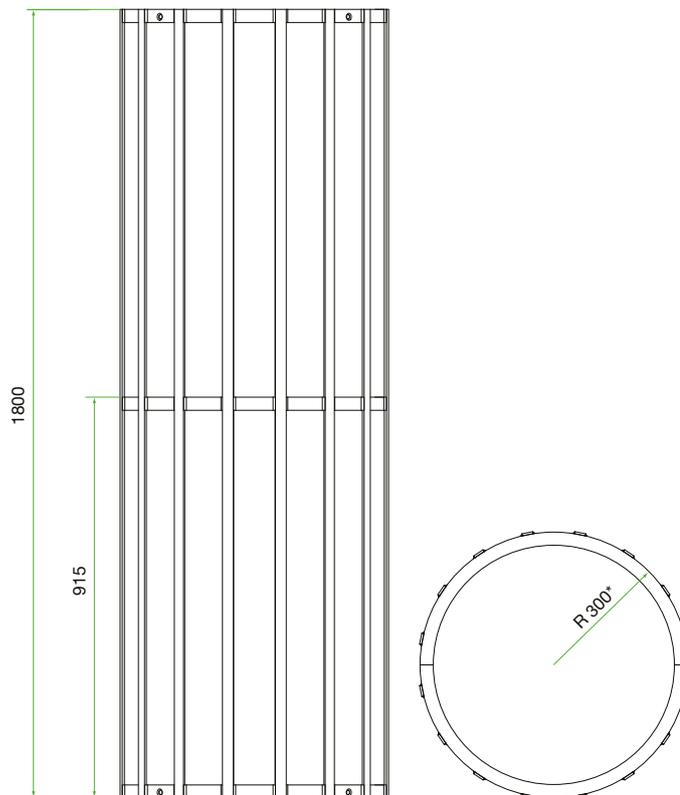
CONIS5A	55kg
CONIS6A	63kg



*Note: Also available with centre radius of 250

Product data sheet

Derwent Tree Guard



*Note: Also available with centre radius of 250

TYPE

Derwent

CODE SIZE

DERW5A	1800 x 500mm dia
DERW6A	1800 x 600mm dia

MATERIAL

Mild steel

FINISH

Zinc rich primer with polyester powder top coat to DIN EN ISO 12944-2

COLOUR

RAL 9005 Satin. Other RAL colours available to special order

WEIGHT

DERW5A	55kg
DERW6A	63kg

Product data sheet

Ennerdale Tree Guard

TYPE

Ennerdale

CODE SIZE

ENNER5A 1800 x 500mm dia
ENNER6A 1800 x 600mm dia

MATERIAL

Mild steel

FINISH

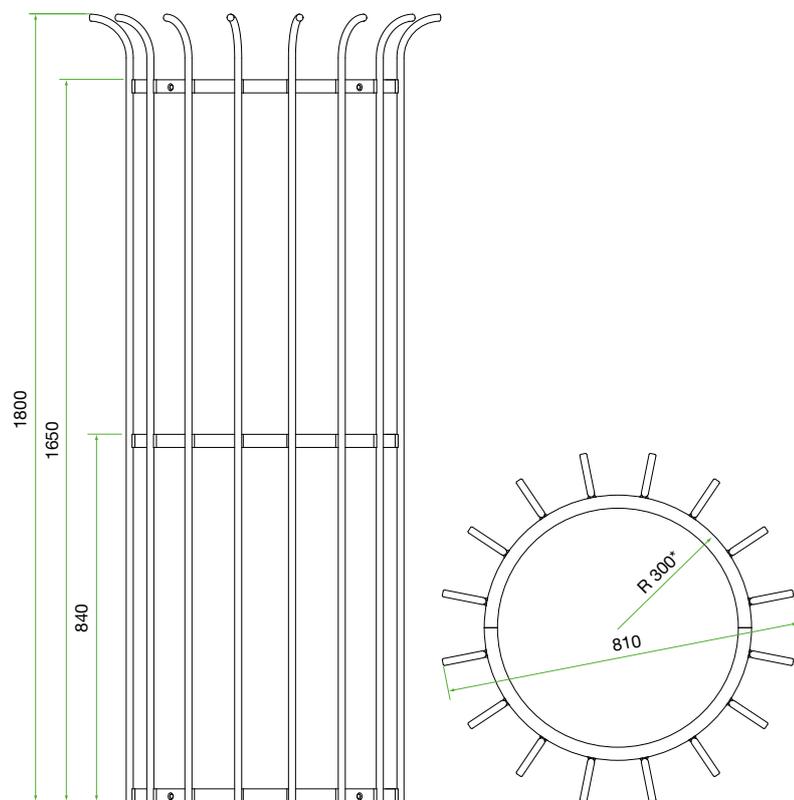
Zinc rich primer with polyester powder top coat to DIN EN ISO 12944-2

COLOUR

RAL 9005 Satin. Other RAL colours available to special order

WEIGHT

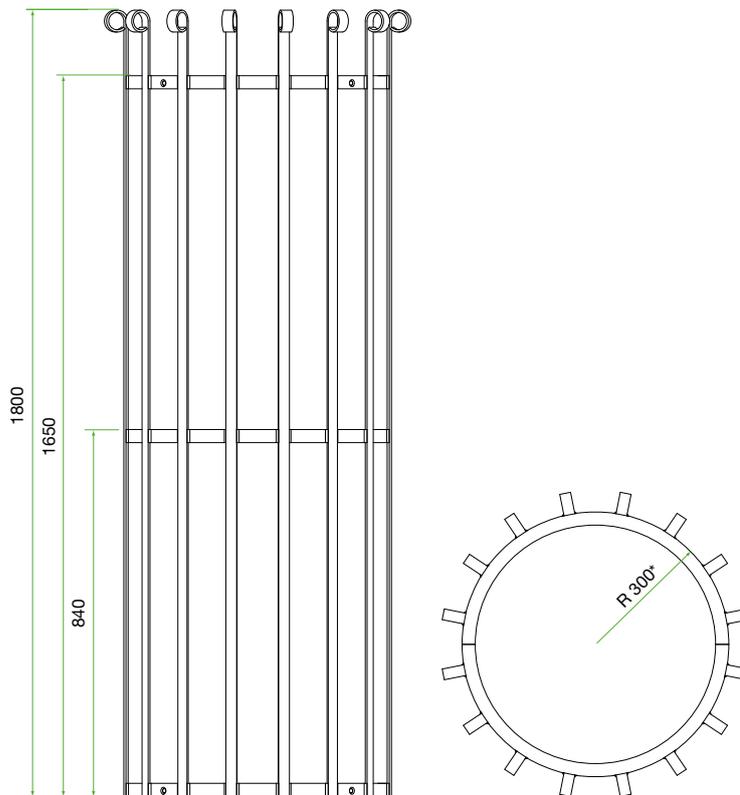
ENNER5A 55kg
ENNER6A 63kg



*Note: Also available with centre radius of 250

Product data sheet

Thirlmere Tree Guard



*Note: Also available with centre radius of 250

TYPE

Thirlmere

CODE SIZE

THIRL05A	1800 x 500mm dia
THIRL06A	1800 x 600mm dia

MATERIAL

Mild steel

FINISH

Zinc rich primer with polyester powder top coat to DIN EN ISO 12944-2

COLOUR

RAL 9005 Satin. Other RAL colours available to special order

WEIGHT

THIRL05A	55kg
THIRL06A	63kg

Product data sheet

Ullswater Tree Guard

TYPE

Ullswater

CODE SIZE

ULLSSP5A 1800 x 500mm dia
ULLSSP6A 1800 x 600mm dia

MATERIAL

Mild steel

FINISH

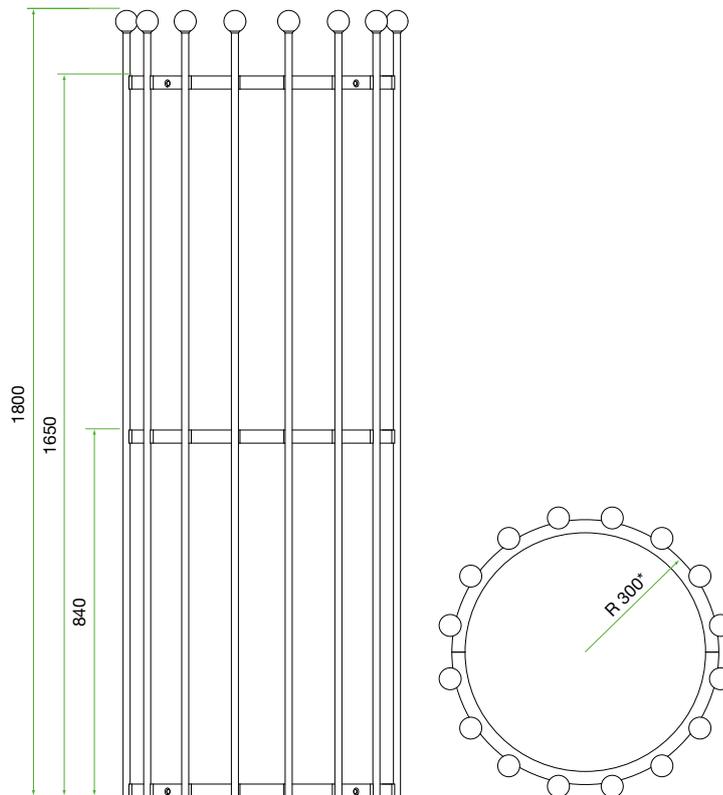
Zinc rich primer with polyester powder top coat to DIN EN ISO 12944-2

COLOUR

RAL 9005 Satin. Other RAL colours available to special order

WEIGHT

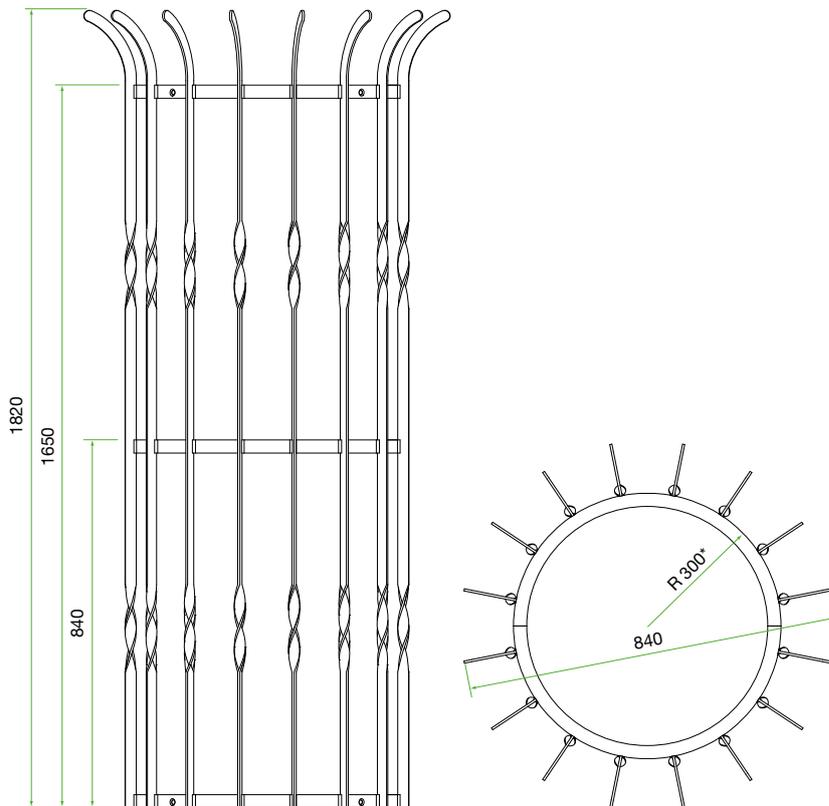
ULLSSP5A 55kg
ULLSSP6A 63kg



*Note: Also available with centre radius of 250

Product data sheet

Windmere Tree Guard



*Note: Also available with centre radius of 250

TYPE

Windmere

CODE SIZE

WIND05A	1800 x 500mm dia
WIND06A	1800 x 600mm dia

MATERIAL

Mild steel

FINISH

Zinc rich primer with polyester powder top coat to DIN EN ISO 12944-2

COLOUR

RAL 9005 Satin. Other RAL colours available to special order

WEIGHT

WIND05A	55kg
WIND06A	63kg



Navy Pier, Chicago, Illinois

Associations

- Arboricultural Association** - Tel: 01242 522152 | Malthouse, Stonehouse, GL10 3DL, Gloucestershire
- Barcham Trees plc** - Tel: 01353 720748 | Eye Hill Drove, Ely, CB7 5XF, Cambridgeshire
- Bat Conservation Trust** - Tel: 0845 1300228 | 15, Cloisters House, 8 Battersea Park Rd, London, SW8 4BG
- CIRIA** - Tel: 020 7549 3300 | Classic House, 174-180 Old Street, London EC1V 9BP
- Forestry Commission / Forest Research** - www.forestry.gov.uk
- Horticultural Trades Association** - Tel: 0118 930 3132 | 19 High St, Reading, RG7 5AH
- Institute of Chartered Foresters** - Tel: 0131 240 1425 | 59 George St, Edinburgh, EH2 2JG
- Institution of Civil Engineers** - Tel: 020 7222 7722 | One Great George Street, Westminster, London, SW1P 3AA
- Kew Arboretum** - Tel: 01483 762955 | Royal Botanic Gardens, Kew Green, Richmond, TW9 3AB
- Landscape Institute** - Tel: 020 7685 2650 | 107 Gray's Inn Road, London, WC1X 8TZ
- National Association of Tree Officers** - Tel: 0161 870 6800 | 3 Church Street, Eccles, Manchester, M30 0DF
- Natural England** - Tel: 01904 435500 | 1-2, Peasholme Green, York, YO1 7PW
- Natural Resources Wales** - Tel: 0300 065 3000 | Ty Cambria, 29 Newport Rd, Cardiff, CF24 0TP
- Royal Horticultural Society** - Tel: 0845 260 5000 | 80 Vincent Square, London, SW1P 2PE
- Royal Institute of British Architects** - Tel: 020 7580 5533 | 66 Portland Place, London, W1B 1AD
- Town & Country Planning Association** - Tel: 020 7930 8903 | 17 Carlton House Terrace, London, SW1Y 5AS
- The Tree Council** - Tel: 020 7407 9992 | 4 Dock Office, Surrey Quays Road, London, SE16 2XU
- Tree Advice Trust** - Tel: 01420 22022 | Alice Holt Lodge, Wrecclesham, Farnham, GU10 4LH
- Trees & Design Group** - general enquiries to suejamesriba@gmail.com
- Trees for Cities** - Tel: 020 7587 1320 | Prince Consort Lodge, Kennington Park Place, London, SE11 4AS
- Wildlife and Countryside Link** - Tel: 020 7820 8600 | 89 Albert Embankment, London, SE1 7TP
- Woodland Trust** - 01476 581111 | Kempton Way, Dysart Rd, Grantham, NG31 6LL

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Olympic Park, London, UK

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Establishing the future urban landscape



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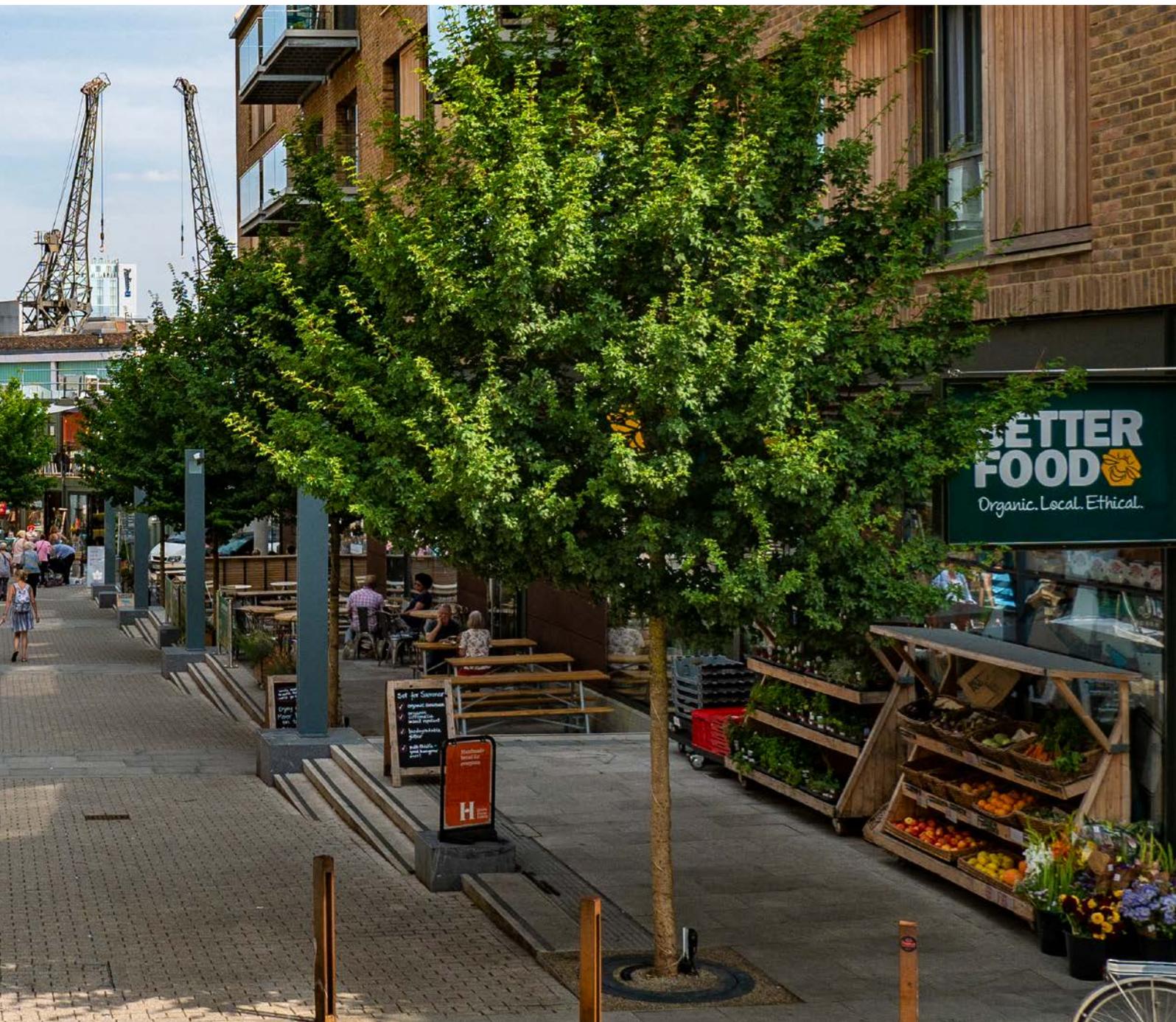
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