F5 – Street Trees

Amendments:

1.0 Introduction

1.1 Street Trees – Key Principles

This Factsheet sets the following principles for incorporating trees into street design:

Trees should be included in all street designs to the satisfaction of the CEC officer. Where trees cannot be included along a street, the street should be designed to incorporate trees into the streetscape in some other way such as a vista or a backdrop.

The provision of trees and green infrastructure is fundamental to good street design. Trees make residents happier, healthier and wealthier and all streets should provide these green benefits.

All projects involving tree planting must include a project arboriculturist to advise on all tree-related matters. The arboricultural expert should be involved from the beginning of the project.

All tree planting projects must include a robust plan for watering, aftercare and long-term maintenance. The objective should be to successfully establish, not only plant, new trees.

Tree planting and aftercare must be considered from project inception. A plan must be in place for the tree maintenance budget.

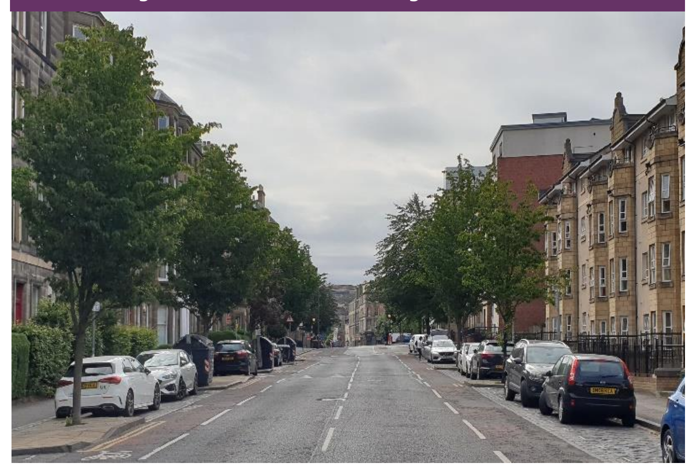
Species with a larger mature size should be planted where possible. Larger trees and long-lived species provide more benefits and should be prioritised where space allows.

As well as new development projects, capital renewals projects should also provide new tree planting, wherever appropriate. They must also allow for retention, protection and maintenance of existing street trees and must reinstate and replant any vacant tree pits and verges within the area.

However, there may be exceptional situations where street trees are not appropriate. For example, in parts of the New Town WHS where the original design concept set trees within the formal layout gardens, squares and walks rather than in the street and to the urban framework of some Conservation Areas.

Figure 1: Trees in hard landscape as an urban design feature

Figure 2: Trees as softening visual feature



Relevant Factsheets:

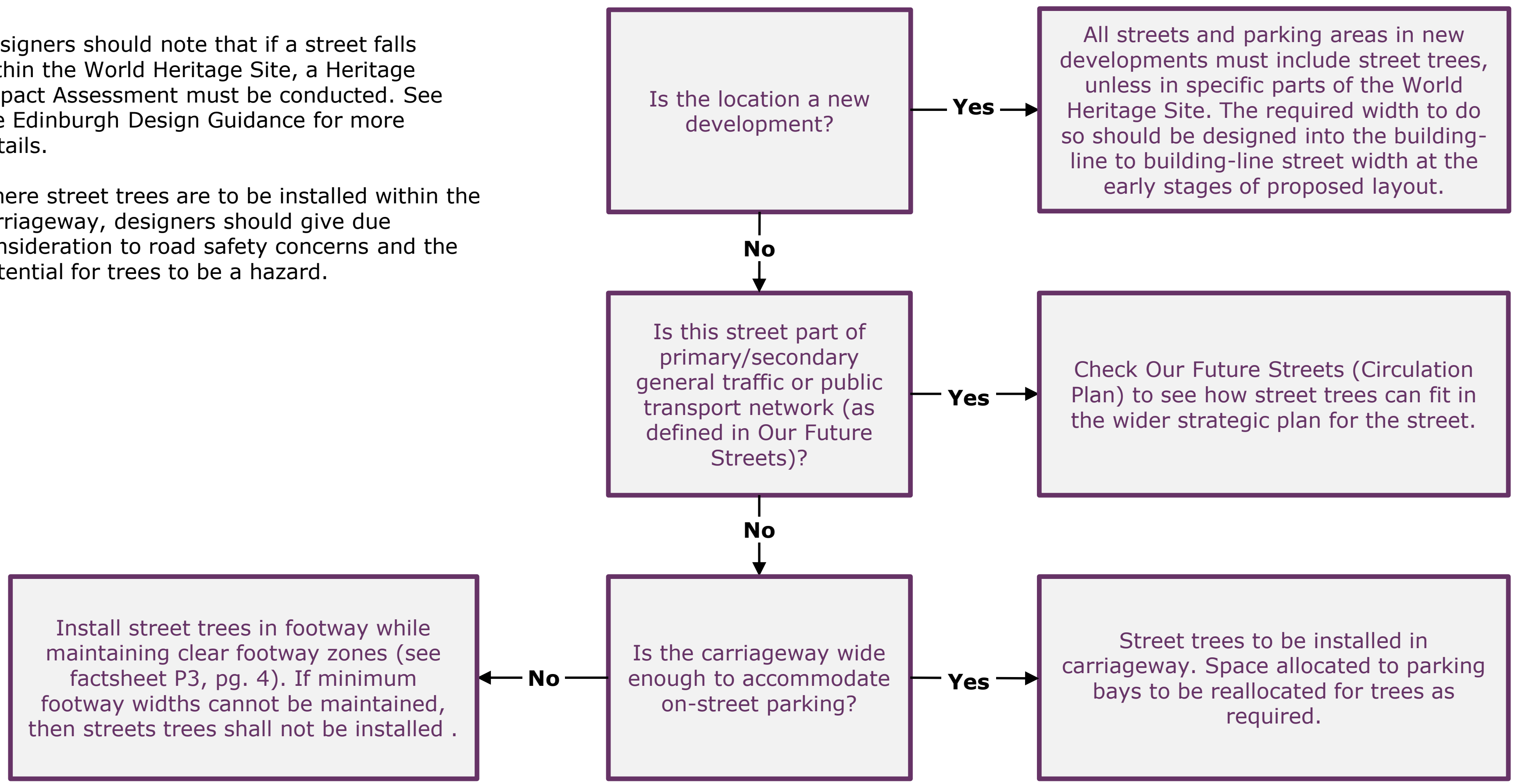
Street as a Place (P1)
Footway Zones (P3)
Street Furniture (F1)
Speed Reduction and Traffic Management (G6)

1.2 Street Trees – Key Principles Continued

The decision tree below provides the process for considering the introduction of street trees to the street environment for different situations.

Designers should note that if a street falls within the World Heritage Site, a Heritage Impact Assessment must be conducted. See the Edinburgh Design Guidance for more details.

Where street trees are to be installed within the carriageway, designers should give due consideration to road safety concerns and the potential for trees to be a hazard.



Relevant Factsheets:

Street as a Place (P1)

Footway Zones (P3)

1.3 The Need for Street Trees

Street trees play an important role in the quality of Edinburgh's urban life.

SOCIAL benefits:
- improving human health and wellbeing, both physical and mental
- encouraging outdoor activity and social cohesion
- reducing noise pollution
- improving educational outcomes
- providing a link with both the past and the future.

ENVIRONMENTAL benefits:
- moderating temperature and reducing the urban heat island effect
- airborne pollutant-removal and better urban air quality
- reducing flooding by intercepting rainfall and maintaining soil permeability
- providing habitat for urban flora and fauna, improving local biodiversity
- forming green corridors which connect greenspaces and enhance the green-blue network
- carbon capture including increased soil carbon.

ECONOMIC benefits:
- increased property prices
- increased consumer spending
- reduced healthcare spend.

URBAN DESIGN benefits:
- creating beautiful and appealing places
- providing landmarks
- complementing the architecture
- reducing the speed of traffic
- screening buildings and roads
- defining boundaries
- connecting spaces
- providing windbreaks
- providing shade and shelter.

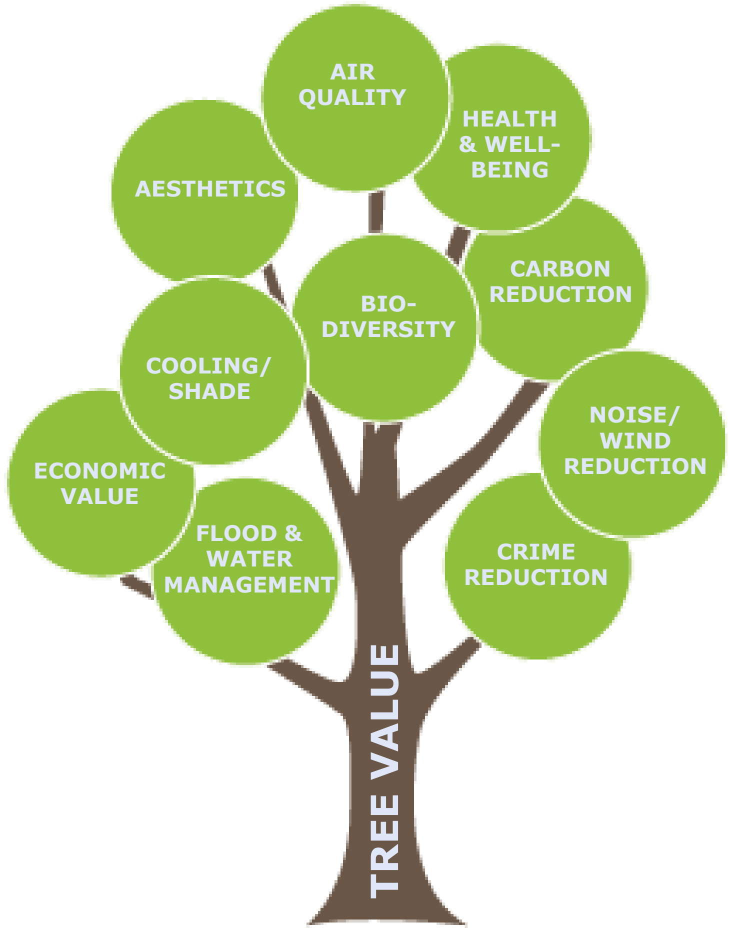
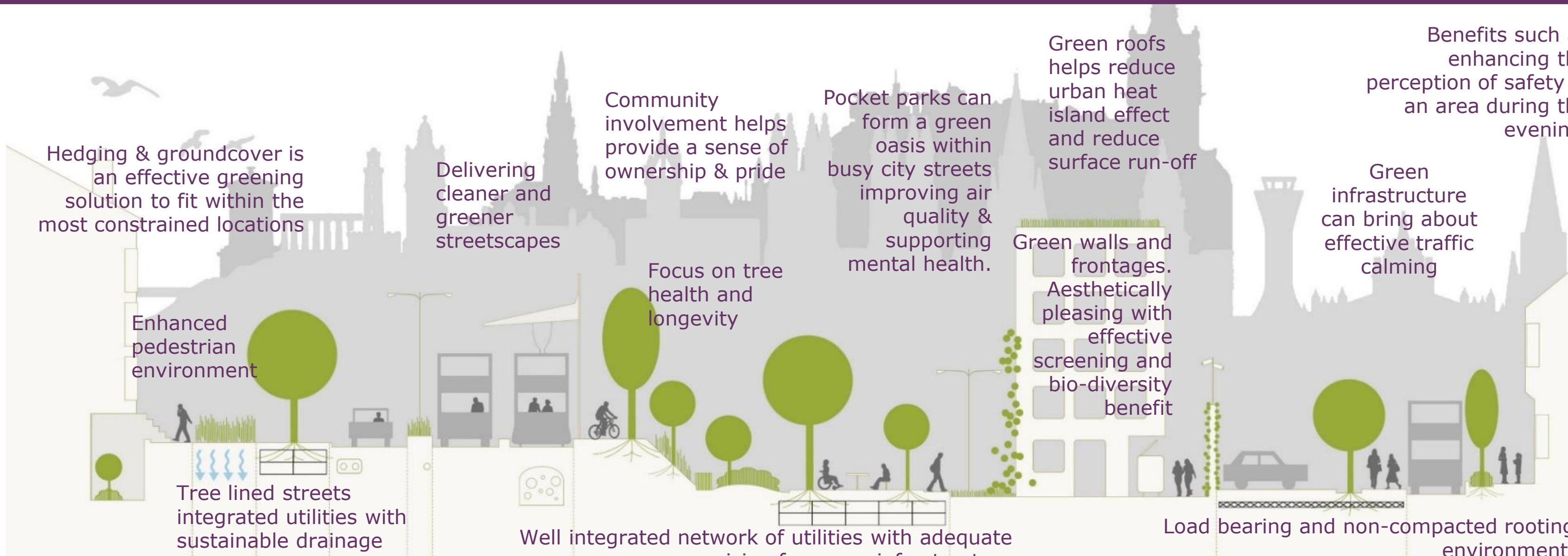


Figure 3: A research study by Natural England estimated that for every £1 spent on tree planting yielded savings of £7 (potential £2.1 billion nationally) in terms of air pollution removal, carbon sequestration and reducing the amount of water going into drains

Relevant Factsheets:
Street as a Place (P1)
Street Furniture (F1)

1.4 The Need for Street Trees (continued)

Figure 4: Trees offer a wide ranger of benefits to local landscapes as a key feature of green infrastructure. Development schemes within Edinburgh should ensure that all opportunities of Green Infrastructure are fully explored. Refer to the Green Infrastructure chapter in the Edinburgh Design Guidance.



The Value of Trees Trees Ecosystem services provided by Edinburgh's trees (calculated by Forest Research in their 2017 iTree report)		
Stormwater mitigation	183 million litres of water intercepted annually	Worth **£247,000 annually** in avoided sewerage charges
Air pollution removal	195,000 tonnes of airborne pollutants removed annually	**£575,000 annually** in avoided damage to health, buildings and crops
Carbon sequestration	4,880 tonnes of atmospheric carbon removed annually	**£1 million annually** for climate change mitigation
Carbon stored	179,000 tonnes of carbon stored in current stock of trees	**£39.8 million (lifetime)** for climate change mitigation

Relevant Factsheets:

Street as a Place (P1)
Footway Zones (P3)
Street Furniture (F1)
Speed Reduction and Traffic Management (G6)

2.0 Preparation and Planning

2.0 Preparation and Planning

2.1 Preparation and Planning - General

Streets are tough places for trees. But with careful planning and good practice, streets can be lined with healthy and thriving trees for residents to enjoy.

Include an arboricultural professional in the project from its beginning. Establish a shared vision within the design team about the inclusion of street trees.

Below ground considerations

- Rooting volume: tree roots need adequate soil volume to grow.
- Loading capacity: the design must allow for the pressure of vehicles and footfall over the roots without compacting the rootzone material.
- Gas exchange: the rootzone must have a supply of oxygen and be able to release carbon dioxide.
- Water exchange: the rootzone must be permeable to water and have good water retention without becoming waterlogged.
- Soil quality: the existing onsite soil may not meet the requirements for new trees so suitable soil may need to be sourced.
- Underground utilities: the design should keep tree roots and utilities as separate as possible.
- Tree pit surfacing: the surface around the trunk should allow for future growth.

Above ground considerations

- Adequate space: the design should account for the eventual mature size of the trees, and avoid conflicts with structures including:
    - Buildings
    - Overhead utilities
    - Vehicles
    - Pedestrians
    - Street lighting
    - CCTV
- Sight lines: trees should fit into the streetscape without compromising its useability.
- Tree protection: the design should provide protective features for trees where they will be vulnerable to damage from vehicles, mowers or strimmers.

Arboricultural considerations

- Species selection: this must be carefully considered with input from an arboricultural professional and should include a suitable degree of diversity.
- Support and protection: newly planted trees will need support and protection, e.g. stakes and guards.
- Watering: newly planted trees need regular irrigation from April to September in the first 3 to 5 years.
- Maintenance: long-term maintenance should be planned, including removal of tree ties, inspection, pruning and replacement of any trees which die.

Obtaining expert advice

Designing public space with street trees typically involves a range of professionals who work together. Landscape Architects (who can be found via the Landscape Institute) and arboriculturists (who can be found via the Arboricultural Association and the Institute of Chartered Foresters) should be involved in street tree planting projects from the outset, with additional design services from a civil engineer also frequently needed.

Figure 5: Typical street conditions: trees along kerbline

Relevant Factsheets:

Footway Zones (P3)

Promoting pedestrian movement and activity (P2)

Street Furniture (F1)

2.2 Preparation and Planning - Trees for Existing Streets

Opportunities

- Master planning of areas and neighborhoods including rethinking existing streets.
- Street layout reconfigurations
- Existing grass verges (note, trees in verges need adequate protection particularly from vehicles using verges for parking).
- Parking spaces reduced to allow build outs for tree pits
- Empty tree pits from previously lost trees
- Removal of a carriageway space
- Incorporation of bicycle infrastructure
- Creation of pocket parks

Guidance

- Isolated, single tree retrofits may be out of character and are less likely to be maintained.
- Existing utility diversions likely to be cost prohibitive.

Community engagement

Consult with local residents, businesses and community groups when planning new trees.

Involve residents in the process where possible. For example, hold a volunteer hedgerow planting day or get local families to “adopt” and water trees (in addition to, not instead of, a contracted irrigation programme). Community engagement can increase planting success, decrease vandalism and create a local sense of pride.

Existing trees

Existing trees which are already established in the street should be retained and protected as a top priority.

Mature trees offer much greater benefits the city than newly planted trees. New trees will take decades to replicate the landscape impact and ecological value of mature trees, if they ever achieve this.

When developing around existing trees, carry out a tree survey and develop a tree protection plan using the guidance provided in BS5837:2012 Trees in Relation to Design, Demolition and Construction.

Seek expert advice

Always seek advice from an arboriculturist and include them in planning from the start of the project. Your arboriculturist will advise on pit design, planting location, species selection, tree procurement, planting technique, tree protection, watering, aftercare and long-term maintenance:

Forestry Service 0131 311 7074, or
forestry.service@edinburgh.gov.uk

Figure 6: London Borough of Hammersmith and Fulham

Before	After

2.3 Preparation and Planning - Trees for New Streets

New streets offer the greatest opportunity for new tree planting. All new streets should incorporate street tree planting wherever possible. This can make a difference to the quality of life for residents for generations to come.

Throughout all stages of the design process, a message of tree inclusion must be championed to ensure the next generation of city streets allow green infrastructure to thrive alongside the modern streetscape.

Plan early and include trees

Citywide and local master plans should include provision for street trees. These should be incorporated into individual planning application reviews and capital works projects.

The best opportunity for new street trees is when designing a new street from scratch. Allocating space in a new design is much easier than re-allocating space previously used by cars, pedestrians or utilities. Flooding risk can be reduced, as well as irrigation requirements, by strategically designing new streets and tree pits to intercept and retain rainfall.

Key considerations

- Include trees in all new streets.
- Obtain the advice of an arboricultural expert early in the project to maximise the chances of success.
- Plant tree species with larger mature size where possible. Larger trees bring more benefits. Use small and fastigiate species only where necessary.
- Streets in new developments should be designed in accordance with chapter 4: Edinburgh Street Design Guidance and Designing Streets. In particular, new streets should be wide enough to contain cycleways, footpaths and green verges that are capable of accommodating street trees.
- Rather than squeezing trees into narrow spaces and raised planters, treat them as a priority and design in generous spaces for them.
- Carefully design the below-ground environment to accommodate roots, resist compaction and allow for air and water movement.
- Consider the use of root barriers to reduce future root damage.
- Prioritise trees in public spaces – trees in private spaces are desirable but a lower priority.
- Plan and budget for tree watering, support and protection, aftercare, replacement of failed trees, and long-term maintenance.

Figure 7: Locating street trees in urban areas – a useful element to separate people from traffic

Contacts

For street trees in relation to **new streets, master plans and planning applications**:

The Planning **Case Officer** (who will liaise with Landscape planning)

Planning Office
0131 529 3550, or
planning@edinburgh.gov.uk

3.0 Technical Guidance

3.0 Technical Guidance

This section outlines technical guidance for urban tree design, pit construction, planting and maintenance

3.1 Urban Fit

Figure 8: Trees of the right scale help to make great streets

Figure 9: Clear footway zone and clear stems support easy pedestrian movement

Tree pits must not only integrate with available space below ground, but equally adhere to footway clear zone standards and to anticipated use by vehicles.

The clear zone should be entirely free of obstructions to allow for unhindered pedestrian movement along the footway.

The width of the clear zone provided should relate directly to the character and use of the street, and in particular the volume of pedestrians. The footway clear zone should be designed to comfortably accommodate peak pedestrian demand.

Height clearance is also important. On footways, trees should have a min. 2m clear stem. This should be Increased when adjacent to cycle routes to a min. 2.5m.

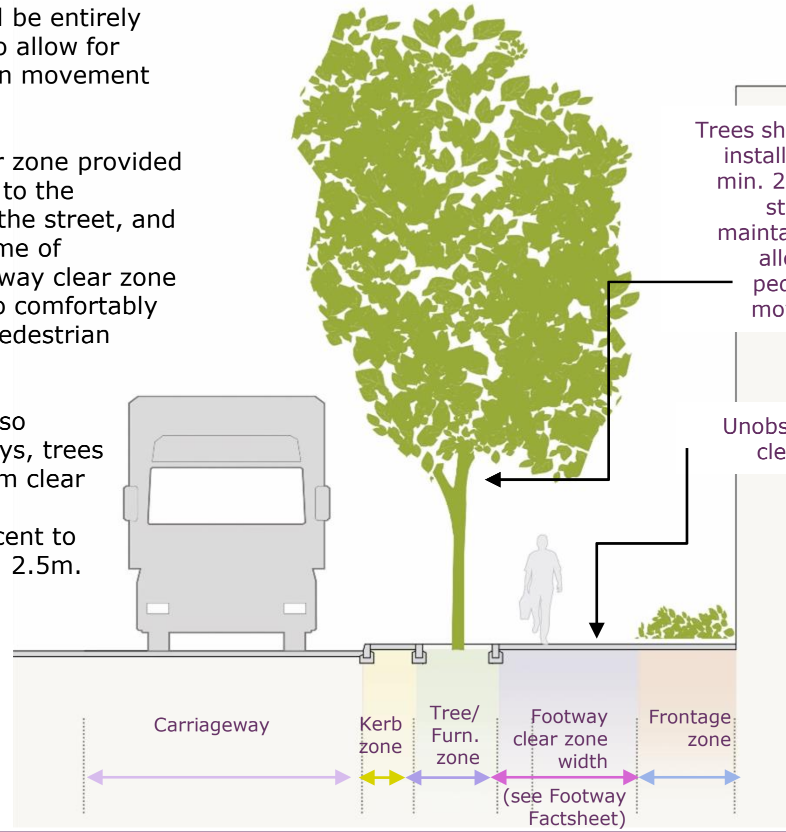


Figure 10: Indicative diagram – not to scale

Relevant Factsheets:

Street geometry and layout (G1)
Footway Zones (P3)
Speed reduction and traffic management (G6)
Promoting pedestrian movement and activity (P2)

3.2 Urban Fit (continued)

Figure 11: Trees on a bus route – species selection and placement can mitigate conflicts

Bus routes

The placement of trees on bus routes needs design consideration. The species selection is important (with upright branching species suitable to avoid conflict). Trees adjacent to bus routes should be maintained so that no branches are within 500mm of the kerb edge for at least the height of an upper deck (plus standing passengers on open top tours).

Tram routes

Tree placement alongside tram routes requires similar spatial coordination

Trees and waste management

Bin lorries travel on most city streets, including non-adopted roads. Tree placement needs to take cognisance of access requirements. Please refer to CEC 'Instructions for Architects and Developers'. The placement of trees, and overhanging branches, should also be considered at bin enclosures where overhead/crane lift access is needed.

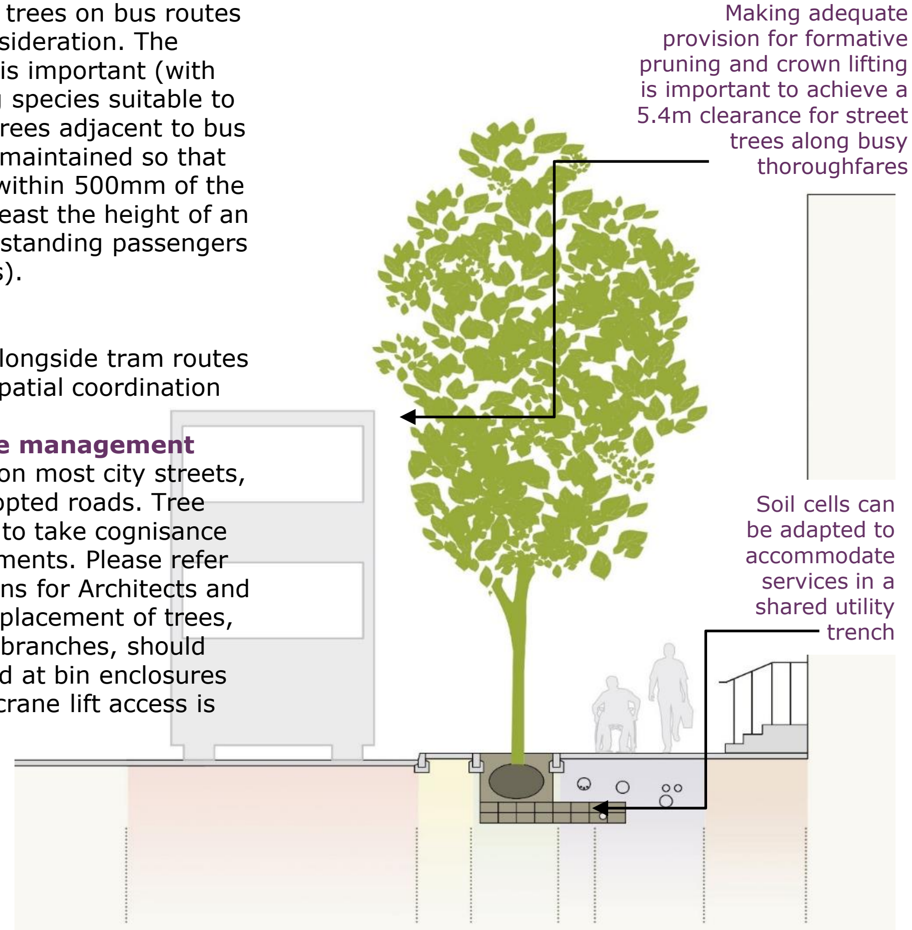


Figure 12: Indicative diagram – not to scale

Relevant Factsheets:

Street geometry and layout (G1) Footway Zones (P3) Speed reduction and traffic management (G6) Promoting pedestrian movement and activity (P2)

3.3 Trees in Paving

Trees in paved areas should be located in larger beds, trenches or linked pits with drainage and irrigation provided.

Paving should be supported independently and not by the growing soil of the tree pit. This prevents paving subsidence and keeps the rootzone uncompacted. See technical guidance on following pages using cell/raft/structural soil systems to provide structural support to paved areas.
The use of a substantial kerb or lip can deflect road salt from polluting soil around the tree, but a level surface should be provided on the pedestrian route.

A range of tree pit and surface materials are available (p.23) and should be chosen based upon the location and specific requirements of the tree.

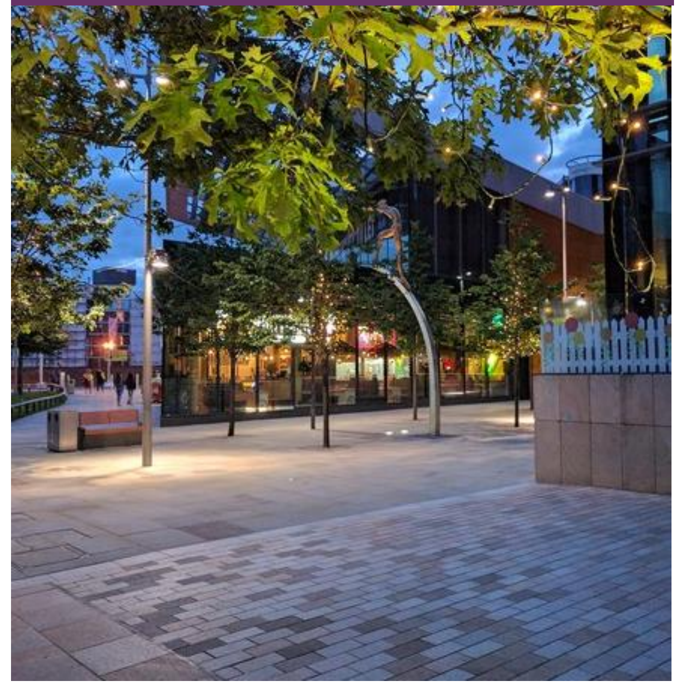
There are many different tree pit specifications of varying complexity, but no one design will be suitable in all situations and options should be agreed with the highway authority’s arboricultural and landscape officer. Elements of the tree pit which must be considered include:

- **Pit dimensions**
- **Soil specification**
- **Anchoring method**
- **Edging material**
- **Use of structural elements such as root cells**

Figure 13: Trees in paving, Hunter Square, Edinburgh

Figure 14: Lauriston Place, Edinburgh

Figure 15: Trees with lighting as an evening/night time feature



Relevant Factsheets:

Footway Paving (M3)
Footway Zones (P3)
Street as a Place (P1)
Street Furniture (F1)

3.4 Soil Volumes

The volume of soil suitable for successful establishment is a key aspect of street trees. The actual volume is based on both previously successful installations, and on scientific research. The latter has driven the commonly held method for establishing soil volume requirements, based on the ultimate size of the tree to be planted:

0.6 cubic metres of soil per 1 square metre of canopy area of the tree's ultimate size

Example:
Projected Mature Canopy Diameter = 4m radius

Projected Mature Canopy Area (A=πr2) = 50 m sq

Target Soil Volume (Area x 0.6m) =30 m cu

User-friendly sizing guides are available, including: https://greenblue.com/gb/resources/soil-calculator/

The diagrams opposite illustrate the calculations for typical examples, some using multiple trees (where shared soil volumes provide efficient footprints and a reduction in the volume per tree).

Soil volume; however, is only one of the critical factors. In typical urban contexts, finding unrestricted areas needed for preferred soil volumes can be very difficult. That should not lead to projects where street trees are simply not proposed.

Successful urban planting is possible with lower soil volumes and creative approaches, especially working around buried utilities.

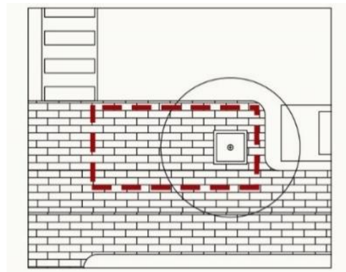


Figure 16

Figure 16 – Medium Tree Pits (Canopy radius is 2.5m)

- Projected Mature Canopy Diameter: **5m (2.5m radius)**
- Projected Mature Canopy Area (π × Radius²): **20m²**(Area)
- Target Soil Volume (m³), (Area × 0.6m): **12m³**
- Assumed growing soil depth (1.0m): 12m² surface area.
- 12m² surface area = Approx. tree pit measurements: 4m long x 3m wide.

Pref. soil volume target: 12m³

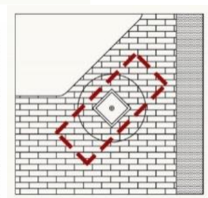


Figure 17

Figure 17 – Small Tree Pits (Canopy radius is 1.5m)

- Projected Mature Canopy Diameter: **3m (1.5m radius)**
- Projected Mature Canopy Area, (π × Radius²): **7m²**(Area)
- Target Soil Volume (m³), (Area × 0.6m): **4.2m³**
- Assumed growing soil depth (0.5m): 8.4m² surface area.
- 8.4m² surface area = Approx. tree pit measurements: 4m long x 2m wide.

Pref. soil volume target: 4.2m³

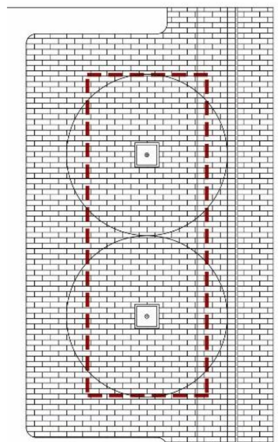


Figure 18

Figure 18 – Large Linked Tree Pits (Canopy radius is 4m)

- Projected Mature Canopy Diameter: **8m (4m radius)**
- Projected Mature Canopy Area (50m²), (2x π × Radius²): **100m²**(Area)
- Target Soil Volume (m³), (Area × 0.6m): **60m³**
- 20% reduction for linked tree pits: **48m³**
- Assumed growing soil depth (1.0m): 48m² surface area required.
- 48m² surface area = Approx. tree pit measurements: 8m long x 6m wide.

Pref. soil volume target: 48m³

Figure 19 – Medium Linked Tree Pits (Canopy radius is 2.5m)

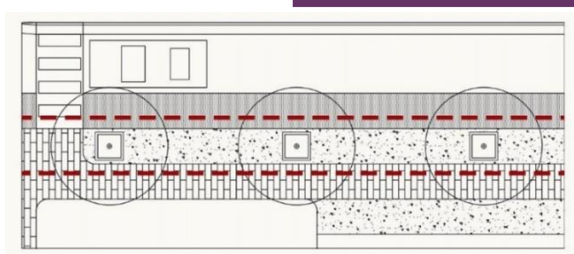


Figure 19

- Projected Mature Canopy Diameter: **5m (radius 2.5m)**
- Projected Mature Canopy Area, (3x π × Radius²): **60m²**(Area)
- Target Soil Volume (m³), (Area × 0.6m): **36m³**
- 20% reduction for linked tree pits: **29m³**
- Approx. tree pit measurements: 8m long x 3.5m wide.

Pref. soil volume target: 29m³

3.5 Tree Pit Sizing

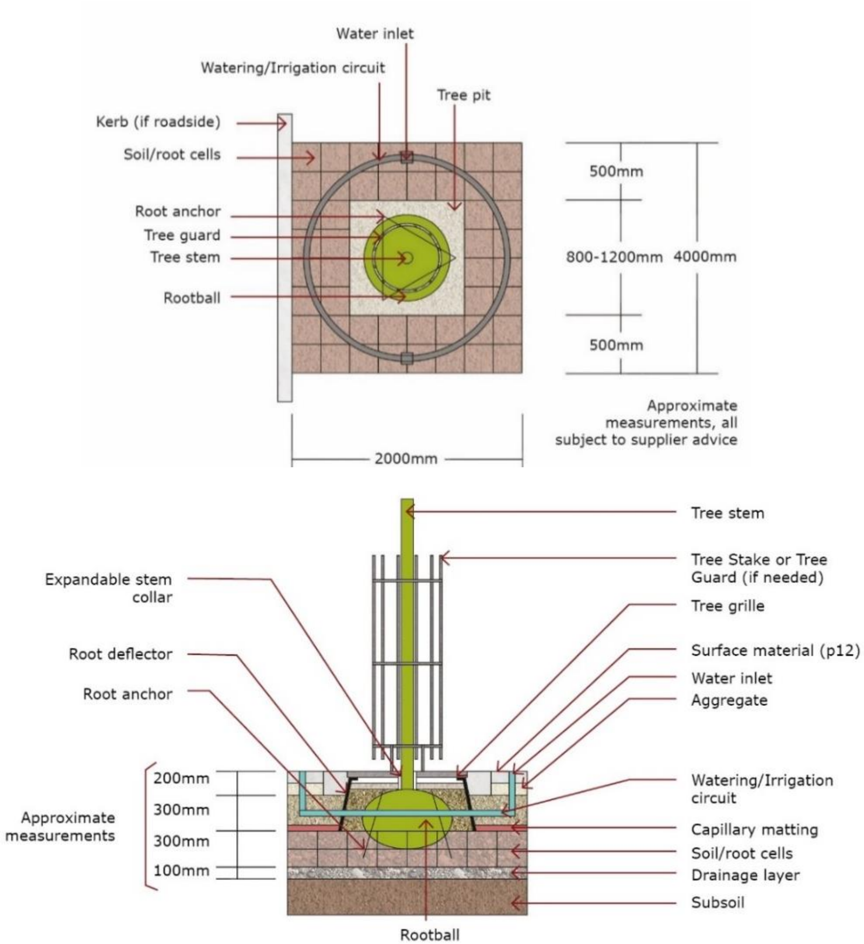


Figure 20: Indicative diagrams

Space for tree pits

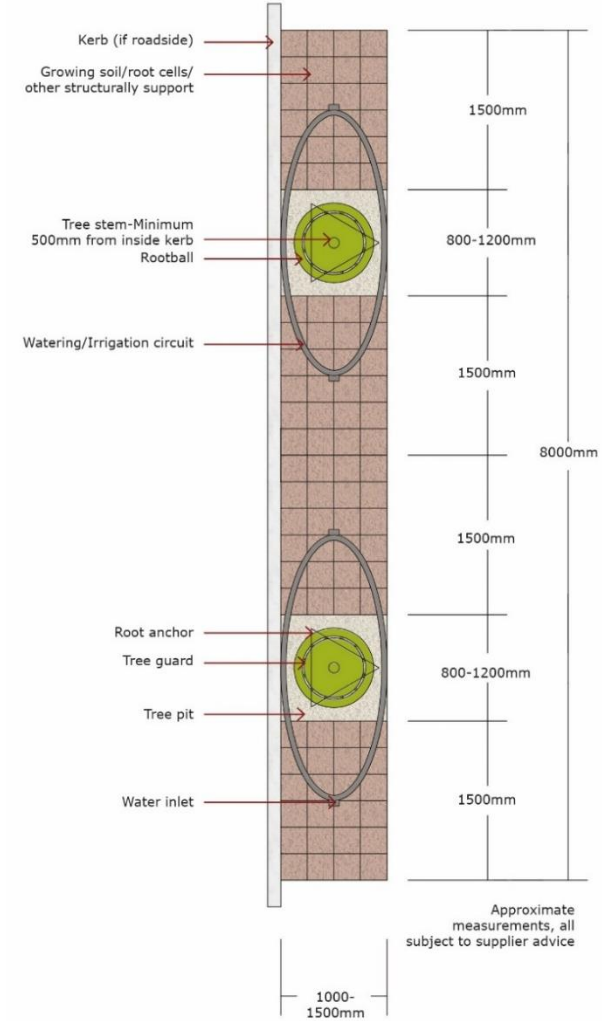
Generous and comfortable space should be allocated for tree pits. Narrow tree pits should be used only where it is not possible to provide wider pits. The diagrams to the left show an example of a tree pit design in a wide space. The diagram to the right shows an example of a tree pit design in a narrow space. Longitudinal underground linking of pits is used to compensate for the lack of width.

Shared trench planting is preferable and will reduce the soil requirements with roots able to share space. Where space is available , utilise a layout which allows roots to grow in all directions (e.g., a square rooting area rather than a linear shape).

Tree pit specifications are to be used as a guide only and installed where possible but can be modified to suit a particular location or space.

Use of the details provided in this guidance does not remove the need for a suitably qualified designer to be involved in the process. Soil volume should be appropriate for the species used and surface finishes should be consistent with the surrounding area (Refer to Soil Volume examples).

Figure 21: Narrow tree pit/trench example



Relevant Factsheets: Footway Paving (M3) Street as a Place (P1) Street Furniture (F1) Footways (P3)

3.6 Tree Pit Design/Construction

Streets are predominantly a hard surface environment. Installing trees into this landscape needs special design and installation techniques, particularly allowing for:

- a large rooting volume
- suitable soil material/specification
- support for a robust surface material (e.g., footway/cycleway)

There are several broad construction techniques which allow for uncompacted soil volume suitable for roots and a structurally supported surface for pedestrians or even vehicles.

Although the illustrations in this guide generally indicate a root cell system of construction, other methods are viable and may be preferable. These are described below.

New methods of tree pit construction are being continuously developed and may be applicable for Edinburgh. The method of construction should be designed and specified by a competent professional.

Prior to the construction phase, site managers should receive training on tree protection BS 5837:2012, environmental awareness (ISO 9001 certification) and the installation of load-bearing/low-compaction root growing environment.

Construction Type 1 - Open/soft planting pit or trench

This system requires the least engineering and maintains a high degree of future flexibility and maintainability. **It should be the first construction type considered and is often the least expensive option.**

It may not be suitable for very heavily used pedestrian areas but can include physical edge design for busy areas. The additional advantages to open pits or verges are the environmental and visual benefits of underplanting and groundcover which can add to the streetscape, and performance benefits such as sustainable drainage.

Figure 22: Tree with open pit/trench and underplanting.

Construction Type 2 - Root cell systems

These systems provide support to the paved surface through structural cells. The cells allow for a large void space below the surface which is filled with an uncompacted growing soil.

This allows for larger soil volumes to be installed than would typically be permitted in a congested street environment. These systems can be combined with water sensitive design to intercept rainwater run-off.

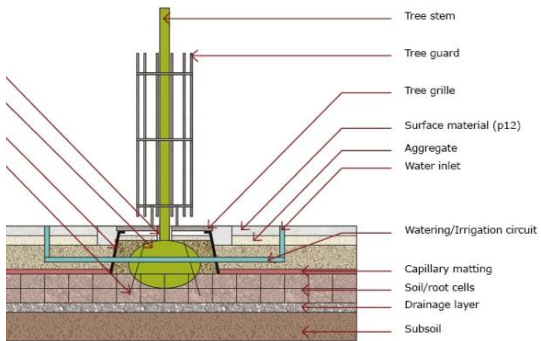


Figure 23: Root Cell System (Full detail p.13)

Relevant Factsheets:
Footway Paving (M3)
Footway Zones (P3)
Street Furniture (F1)

3.7 Tree Pit Design/Construction (continued)

Construction Type 3 - Raft systems

Raft systems use either concrete or manufactured 'rafts' for structural support to the paved surface. This provides a larger growing volume for trees, similar to the root cell system.

Whereas cells support the paved surface from below, rafts support the trench by spanning over it. Rafts can be a cost-effective way of providing large soil volumes.

Figure 24: Raft system installation and completed project, Glasgow

Construction Type 4 - Structural soil

Structural soil – these are soils designed to provide structural support to the paved surface while resisting compaction, maintaining permeability for air and water.

These soils need to be specified and used cautiously to ensure the make up contains enough organic material to support long-term tree establishment.

The Stockholm Method

The Stockholm method is a tree pit design based on a layered structural soil mix and geotextile.

It supports load-bearing footways and roads while maintaining uncompacted voids throughout the rootzone and channelling rainwater into the roots. It produces a structurally sound and ecologically sustainable tree planting area that can be easily maintained. Installation of the Stockholm method requires a skilled and knowledgeable contractor and should be supervised by the project landscape architect or arboriculturist to ensure all layers are installed correctly.

Figure 25: Urban tree pit installation sequence in Stockholm

Relevant Factsheets:

Footway Paving (M3)

Footway Zones (P3)

Street Furniture (F1)

3.8 Surface Materials

For existing and new trees, a range of surface materials can be used as displayed in the table on the following page.

Each surface material has its advantages and disadvantages, and no one surface treatment is suitable for all situations

Open, planted tree pits are the preferred method; however, in areas of high pedestrian volumes permeable hard surface infill may be more appropriate in tree pits.

CEC Roads team and the Forestry Service should be consulted where retrospective resurfacing is needed. In cases where tree roots conflict with footway materials the project arboriculturist will be able to advise on a suitable solution.

Surface material selection

There are various factors to consider, including:

- Level of traffic/use
- Amount of usable footway space
- Character/existing material
- Budget
- Surface run-off
- Ecological value

The choice of surfacing can also have a large impact on the overall construction and cost of new tree pits, as paved surface pits require structural support (engineered solutions are covered in this guide), whereas open tree pits with planting or mulch surfacing may require no, or only partial pit area structural support.

Open tree pits, with planting as groundcover, are to be considered the default option.

Figure 27: Open pit in line with parking

Figure 26: Open surface tree pit with groundcover

Figure 28: Resin surface treatment

3.9 Surface Materials (continued)








Selection criteria	Gravel: Resin bound	Gravel: Self binding	Tree Grilles	Mulch: Inorganic	Mulch: Organic	Rubber crumb	Soil(with under planting)	Asphalt
Tree criteria								
Permeability for air and water to reach the rooting medium if correctly maintained	**High**	**Medium**	**High**	**High**	**High**	**High**	**High**	**Low**
Flexibility of material	**Medium**	**High**	**Low**	**High**	**High**	**High**	**High**	**Medium**
Potential to improve soil fertility	**Low**	**Low**	**Low**	**Low**	**High**	**Low**	**Medium**	**Low**
Suitability for installation up to the base of a young tree	**Low**	**Medium**	**Low**	**High**	**High**	**Medium**	**High**	**Low**
Risk of damaging young tree health if incorrectly installed	**High**	**High**	**Medium**	**Low**	**Low**	**Medium**	**Low**	**High**
Risk of damaging established tree health if incorrectly installed	**Low**	**Low**	**High**	**Low**	**Low**	**Low**	**Low**	**Medium**
Risk of damaging young/established tree health if unmaintained	**Medium**	**Low**	**High**	**Low**	**Low**	**Medium**	**Low**	**Medium**
Site criteria								
Tolerance to regular pedestrian traffic	**High**	**Medium**	**High**	**Low**	**Low**	**High**	**Low**	**High**
Resistance to street sweeping machines/animal excavation	**High**	**Low**	**High**	**Low**	**Low**	**High**	**Low**	**High**
Effectiveness at suppressing weed growth	**Medium**	**Medium**	**Low**	**High**	**Medium**	**Medium**	**Low**	**High**
Availability of different colours/styles	**High**	**Low**	**High**	**High**	**Low**	**High**	**Low**	**Medium**
Installation and maintenance criteria								
Suitability for installation immediately after tree planting	**Medium**	**Medium**	**High**	**High**	**High**	**Low**	**High**	**Low**
Likelihood of requiring a subbase prior to installation	**High**	**Low**	**High**	**Low**	**Low**	**High**	**Low**	**High**
Level of experience/competence required to correctly install and maintain	**High**	**Medium**	**High**	**Low**	**Low**	**High**	**Low**	**Medium**
Expected lifespan of material	**Medium**	**Medium**	**High**	**Low**	**Low**	**Medium**	**Low**	**High**
Whole life cost of material, including purchase, installation, maintenance and disposal	**High**	**Medium**	**Medium**	**Low**	**Low**	**High**	**Low**	**Low**

3.10 Tree Planting and Procurement

Tree planting technique

Planting should take place during winter when the trees are dormant. The ground at the time of planting should be neither waterlogged nor frozen.

During planting, roots must be protected at all times and trees must not be left in a position which allows their roots to be exposed.

The tree must be planted with the root flare visible and level with the ground, i.e. at the level it was grown in the nursery. Trees planted too low or too high are likely to fail.

Any mulch should have a depth of 50-100mm and be placed in a donut shape around the trunk, with a 10cm gap between the trunk base and the mulch. No mulch or soil should touch the bark as this can promote decay.

The planting hole should be a minimum of 75mm larger than the tree roots and should not have smooth sides. If the hole is dug in a way that produces a smooth wall, it should be scarified before the tree is inserted.

Trees should be watered immediately after planting.

Full guidance on tree procurement, handling, planting and aftercare is provided in

BS8545:2014 Trees: from nursery to independence in the landscape – Recommendations.

Figure 29: Typical planting diagram

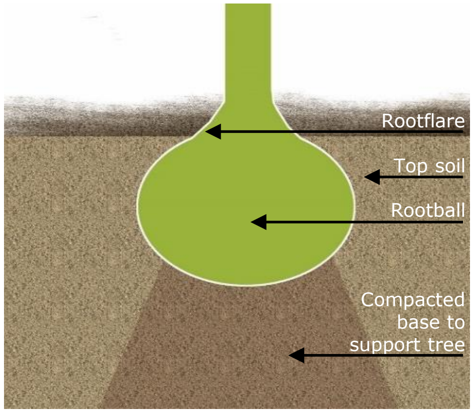


Figure 30: Trees in a nursery

Procurement of tree stock

Trees for planting in the urban space should be sourced from a good quality nursery which undertakes proper biosecurity measures and is able to provide full information and an audit trail on all trees supplied.

Trees to be planted in urban public spaces should usually be a minimum of Extra Heavy Standard size to provide robustness against mechanical damage and vandalism. Tree stock should have a well-developed and fibrous root system, a well-balanced and structured crown and a good stem taper.

3.11 Tree Protection and Support

The need for protection and support

New trees in urban spaces are vulnerable to damage in many ways:

- Vandalism: people might pull trees out or pull off branches.
- Theft: trees may be taken for replanting, or if conifers, for use as Christmas trees.
- Dog damage: some dog owners encourage dogs to strip bark off trees.
- Browsing: if browsing animals such as rabbits or deer are present near the site they may destroy accessible trees.
- Cars: drivers cutting corners or pulling up onto verges/footways to park can clip trunks.
- Wind: before their roots spread and establish, young trees may be blown over by the wind.
- Lawnmowers and strimmers: trees planted in grassed areas are highly vulnerable to damage when during mowing or strimming.

Figure 31: Strimmer damage to young trees is very serious and will prevent them reaching maturity

Support

Young trees need mechanical support to ensure they stay upright while they establish a good root system to anchor them in place.

Trees may be supported below ground by an underground guying system, or above ground by stakes.

Young trees should not be staked too high. Trees need to move in the wind as this stimulates the growth of a strong and tapered trunk.

Stakes should be attached at a point which is high enough to provide support but low enough that the tree still moves in the wind.

Stakes should be positioned at a suitable distance from the trunk to prevent them rubbing on the tree.

Tree ties attaching the tree to the support should be regularly checked to ensure they are not causing damage.

Above-ground tree support should be removed when it is no longer needed – leaving support in place too long can prevent trees from moving in the wind and developing strong trunks.

Tree protection

The degree of protection required will vary depending on the site, but new street trees are likely to need some protection from mechanical damage while they establish.

A triple stake and weldmesh guard design is a low budget option which achieves a good degree of protection. The diameter of the guard should be wide enough to accommodate the tree moving in the wind without the trunk rubbing on the weldmesh.

Whatever protection system is selected, a plan must be in place for periodic checks to ensure it remains fit for purpose, and for its eventual removal when it is no longer needed.

Figure 32: Triple stake and weldmesh guard system

3.12 Tree Species Selection

Right Tree, Right Place

The Council endeavours to follow a Right Tree, Right Place policy – see the Council's "**Trees in the city - Trees and Woodland Action Plan**".

Always seek input from an arboriculturist or landscape architect when selecting appropriate species for a site.

Species diversity and climate change

A wide diversity of tree species is needed for a healthy urban forest, because:

- lack of species diversity can mean large-scale tree losses due to climate change or new pests and diseases.
- different tree species provide different ecosystem services – a diverse range of species provides a greater range of benefits.
- climate change will have unpredictable effects on trees – planting a range of species provides resilience against these changes.
- a diverse range of tree species is more visually interesting in the landscape.

All planting projects should seek to maximise species diversity.

Consider the 30:20:10 principle: a project should include no more than 30% of any one family, no more than 20% of any one genus, and no more than 10% of any one species.

Larger species provide greater benefits

Larger tree species provide a much greater landscape impact, store more carbon, support more wildlife and tend to live longer than smaller species. Select the largest tree species that the site can comfortably accommodate.

Species choice

Factors to consider include:

- Mature height, spread and shape
- Adjacency to vehicles and buildings, where upright branching species may be preferable
- Rooting habit
- Stem diameter
- Maintenance requirements
- Water requirements
- Drought tolerance
- Waterlogging tolerance
- Pest/disease resistance
- Adaptation to changing climate
- Species diversity
- Existing trees and site history
- Qualities of the available soil
- Surrounding architecture
- Allergy potential – trees with high allergy potential should be avoided near sensitive groups e.g. schools, care homes
- Fruit – species that drop fruit are not suitable on all sites
- Foliage type – consider including evergreen species to maximise the benefits provided by foliage

Further resources

Please consult the following documents for more guidance:

- General selection guidance – "Tree Species Selection for Green Infrastructure – A guide for Specifiers" (Tree and Design Action Group, 2018): https://www.tdag.org.uk/tree-species-selection-for-green-infrastructure.html
- Allergy potential: https://www.allergyuk.org/news/tree-pollen-season/?gclid=EAIaIQobChMI7JHz97CG_gIVzwUGAB02uwtcEAAYAiAAEgLNJPD_BwE
- Tackling Air Pollution With Trees (Woodland Trust): https://www.woodlandtrust.org.uk/publications/2012/04/urban-air-quality
- Selection database including climate-adaptable species: http://www.righttrees4cc.org.uk
- Barchams guide to carbon storage potential by species: https://assets.barcham.co.uk/wp-content/uploads/2021/02/TOP-TRUNKS-TABLE.pdf

Contacts

Existing streets:
Forestry Service, Parks and Greenspace on: 0131 311 7074, or forestry.service@edinburgh.gov.uk
to discuss species selection for existing streets.
Future streets:
Planning Office: 0131 529 3550, or planning@edinburgh.gov.uk

3.13 Coordination with Utilities

Make Services Subservient to Layout

The standard arrangement of service corridors beneath the pavement can have a detrimental effect on the layout of new streets. The routing of services should be designed to suit the kind of place that is being created.

There are two variations on the standard services corridor design:

- Routing the services away from the main street, for instance down a back street or through rear courtyards. This may be more direct and economic, and make life easier for those living in the area when the services have to be accessed;
- fitting the services into a defined Zone, for instance by consolidating them in tighter corridors to avoid features such as trees.

Co-ordinate Design Development with Service Providers

Today's extensive site services often require extra space, which can be particularly disruptive to the floorscape during the early periods of development.

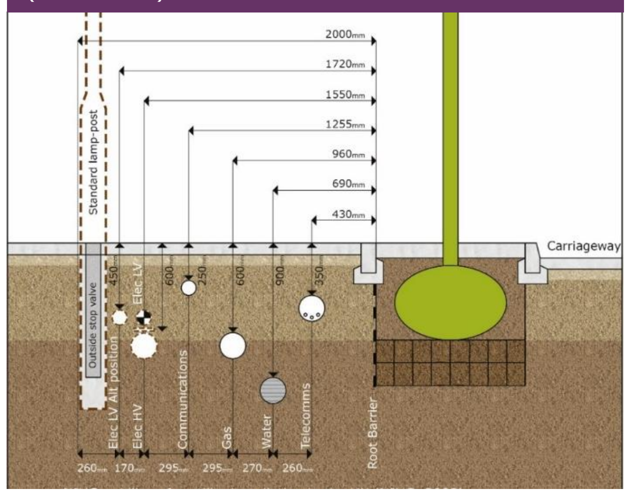
The key is good planning and liaison with the service providers. They need to be involved early in the design process. This consultation should cover routes, requirements and programming. Care should be taken to coordinate routing and access covers with paving design.

Put Services Underground in Shared Strips

Services conventionally follow the routes taken by roads and footpaths and the standard arrangement of a 2m wide corridor beneath the pavement has a major influence, sometimes detrimental, on the layout of new streets.

One main reason for the use of this arrangement is that utility companies have a statutory right to install apparatus in the road; however, subject to the agreement of the utilities, services can be routed away from the adopted carriageway. Multiple services can be accommodated in shared service strips.

Figure 33: Guidelines for utility installation in the UK (NJUG 2003)



For all enquires relating to new streets please contact the planning help desk:

Planning and building:

0131 529 3550, or

planning@Edinburgh.gov.uk

For all inquires relating to existing trees please contact the forestry team:

Forestry Service, Parks, Green Space & Cemeteries: 0131 311 7074, or

forestry.service@Edinburgh.gov.uk

Relevant Factsheets:

Footway Zones (P3)

3.14 Coordination with Utilities (continued)

Public Utilities

Separating public utilities from the street furniture zone and ensuring sufficient clearance for rooting zones makes both tree and utility maintenance easier and reduces costs.

Trees must be adequately protected when works are carried out in close proximity to the trees. This should be carried out in accordance with the principles set out in the documents:

- **National Joint Utilities Group Guidelines 4 (NJUG4)**
- **British Standard 5837 (2012) – Trees in relation to design, demolition and construction.**

Surface Water Drainage

Care should be taken to avoid unwanted interaction between surface water drainage systems and tree roots.

Where possible the two should be integrated to make use of runoff as a source of water for the trees, with care taken to limit or mitigate contaminants such as de-icing salt.

New Streets/Developments

It is desirable to separate trees from public utilities but it is recognised that this can be challenging in narrow footways. In cases where the footway widths are constrained (2.0m or less) and public utilities are to be located within the footway footprint, consider layouts where trees are lined down one side of the street or staggered along the length of a street.

Figure 34: Trees located on one side of the street only.

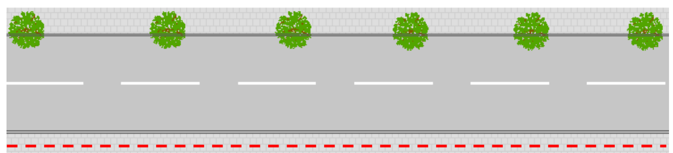
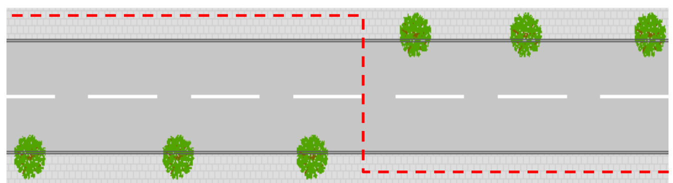


Figure 35: Trees staggered, with utilities located accordingly



The approach considered will depend on the public utilities requirements within the development and the staggering should only take place where there are suitable lengths between staggers, so that trees do not appear erratically placed along the footway.

- Use root-intrusion resistant pipe technology wherever possible.
- Carefully design the tree-rooting environment in proximity to sewer pipes with particular attention to tree species and rooting habits.
- Rationalise space allocation below ground and factor in future access required for utility upgrades and maintenance.
- Consider pruning roots and retro-fitting root barriers in the existing street environment to help protect utilities.

Maintenance

Maintenance arrangements for all planted areas need to be established at an early stage, as they affect the design, including the choice of species and their locations. The approval and maintenance of proposed planting within the street boundary must be required to comply with Sections 50 and 51 of the Roads (Scotland) Act 1984.

Trees differ from other assets in that they often appreciate with age and have less predictable life spans and maintenance regimes than built assets.

In cases where tree roots are conflicting with the footway surface a Forestry Service tree officer must be consulted.

Email
forestry.service@edinburgh.gov.uk

3.15 Coordination with Lighting/CCTV and Junctions

The interaction between street trees, street lighting and CCTV must be carefully managed as what may appear to be suitable position when the tree is planted could become inappropriate as the tree grows.

Poor placement of trees with respect to lighting and CCTV columns can result in:

- Foliage obscuring the luminaire, reducing its effectiveness
- Impaired maintenance access

Trees should ideally be staggered with lighting columns and sufficient horizontal clearance provided between them to avoid the outcomes described above. In the case that they cannot be staggered, it may be acceptable to line one side of the street with trees and the other with lighting columns. Care should be taken; however, to ensure that the tree lined side remains well lit.

BS 5489 (2013) advises that "careful siting of trees and luminaires can help to minimise interference with the performance and operation of the lighting by the foliage."

This principle should be applied when placing street trees. If a staggered arrangement is used, trees should be approximately halfway between lighting columns with at least 5m. clearance between the face of the lighting column and the anticipated tree canopy extent.

Street Trees at Junctions

Extra care should be taken when placing trees at or near junctions as the adverse consequences of these being poorly lit are severe.

When planting trees at junctions, a thorough risk assessment should be undertaken, consider:

- The mature size, spread and shape of the crown
- Street lighting columns
- Traffic signals
- Driver lines of sight
- Road signage.

Figure 36: Poor placement of trees at Watson St/ Tay St Junction, Edinburgh, obstructing driver lines of sight and lighting columns. *Google Maps*.

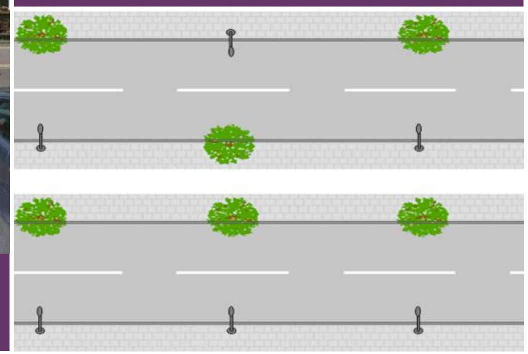
If overhead lighting and tree planting are coordinated, they can be integrated in a positive way: In new schemes or complete refurbishment projects, light/CCTV columns and trees should be positioned so that they reinforce rather than distort visual rhythms and achieve non-obstructing leaf density/crown spread.

The prevention of antisocial behavior and crime in public spaces is better addressed through good urban design, promoting natural surveillance & better management, than through the blanket use of CCTV.

Coordinate street tree and street lighting at the early design stages to avoid unnecessary removal of street trees from projects in order to include suitable lighting.

Planning process may be delayed, and Roads Construction Consent withheld until appropriate coordination of trees and lighting can be achieved.

Figure 37: Staggered layout of lighting columns and trees (top), and one side for trees and one side for trees, one for lighting columns (bottom).



Relevant Factsheets:

Footway Zones (P3)

Street Lighting (F6)

Crossings at or near junctions (G5)

3.16 Best practice examples

Figure 38: Trees located on build outs between parking. McDonald Road, Edinburgh.

Figure 39: Street trees using Arboresin. West Savile Terrace, Edinburgh.

Figure 40: McDonald Road, Edinburgh

Figure 41: Tree lined central reservation, preserving mature trees. Pennywell Road, Edinburgh.

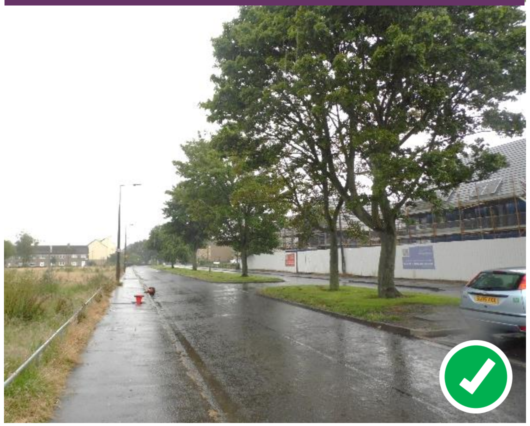
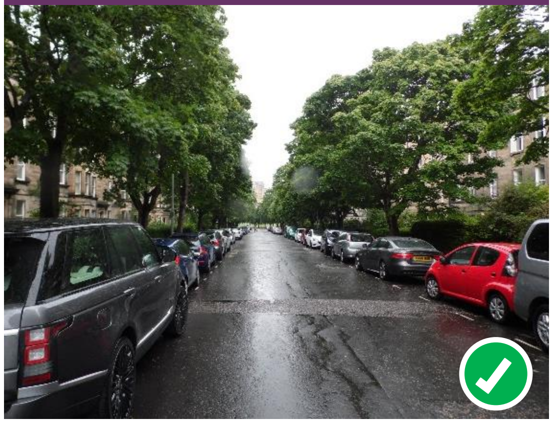


Figure 42: Trees located on one side of the street, with lighting on the other, unobstructed. Wallace Gardens, Edinburgh

Figure 43: Double avenue of street trees - carriageway narrowed & existing trees in pits incorporated Gladstone Terrace, Edinburgh.



Relevant Factsheets:

Street as a Place (P1)

Street Furniture (F1)

Street geometry and layout (G1)

4.0 Maintenance Guidance

4.0 Maintenance Guidance

This section outlines technical guidance for maintenance and establishment practices

4.1 Watering, Establishment and Maintenance

Establishment

Regular maintenance during the establishment period is essential to healthy tree growth. Generally, this is the first 2-3 years period after planting. During this time, regular irrigation and formative pruning is required. Irrigation may be achieved either through hose/bowser watering on site.

Tree watering

Watering newly planted trees is crucial to ensure they successfully establish and reach maturity. Edinburgh is the driest city in Scotland and trees are likely to suffer frequent droughts.

Watering frequency will vary depending on the type of site, pit design and weather conditions; however, it is likely that newly planted trees will need watering 1-2 times per week between April and September for the first 3-5 years. Evergreen species may also need watering in warm, dry periods between October and March.

Tree watering will need to be increased during droughts and decreased during periods of heavy rain; however, tree watering should not be reduced on the grounds of normal summer rainfall unless tree pits have been designed to intercept and retain rainfall.

Irrigation bags can also be used. When filled with water, they slowly release it into the ground over a few hours. This improves water penetration and availability and can improve tree establishment success. Irrigation bags should ideally be installed around a stake rather than the trunk as they can prevent gas exchange through the tree bark and promote decay.

Tree watering is a major expense and may account for up to half of the overall cost of establishing new trees. This cost should be factored in and budgeted for early in the project.

The provision of hose connections should be considered in the design phase of projects to ensure easy maintenance is possible.

Consult an arboriculturist for advice planning a tree watering programme.

Maintenance Responsibility

For trees in adopted highways, the maintenance contact is:
Forestry Service 0131 311 7074, or
forestry.service@edinburgh.gov.uk

For new developments, maintenance responsibilities are required to be included within the Landscape Plan approval. See Roads Construction Consents documents.

Aftercare

A plan should be made for the following tasks:

- Removing tree ties
- Regular inspections of trees
- Formative pruning
- Replacement of mulch
- Weeding
- Replacement of any failed trees

Long-term maintenance

A plan must be in place for the long-term management of the trees. Street trees will need regular inspection and occasional tree works to minimise risk to street users and to ensure they are not developing conflicts with other structures.

Responsibility for the long-term management of the trees should be clear. If the trees are to be adopted for maintenance by the Council this must be clearly agreed. Contact the Forestry Service on forestry.service@edinburgh.gov.uk for any questions about Council tree maintenance.

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