Street Tree Guide 2020
Part Two: How we select our trees
Selecting street trees

Making the decision on which tree species should be planted within a particular street can be a complex process.

Street trees have the potential to remain in place for up to 100 years, so making the wrong choice can be long lasting and expensive. A tree that is badly suited to its physical and functional context is likely to be a significant drain on budgets and resources. It is also likely to cost more to establish, manage and maintain within the streetscape, compared to one that has been chosen with careful consideration of the overall context and environment of its planting site.

Within the community there are different opinions on which species should be planted where, or even whether trees should be planted at all.

It is therefore important that tree selection processes are rigorous and evidence based, taking account of a broad range of selection criteria.

The overall focus is on selecting species that can survive and thrive, developing dense canopies with healthy leaves and a good crown structure. However, there are a range of other criteria that should also be considered in the interests of maximising community investment and ensuring the long term health and resilience of the urban forest.

This part of the Street Tree Guide sets out the City’s tree selection process. This includes:

- an introduction to the underlying philosophy of the ‘right tree for the right place’
- a description and explanation of the range and hierarchy of selection criteria
- street tree trials; and
- the City’s tree list - the range of species that have been approved for planting within city streets.
How we have selected our street trees

The City’s tree selection process is underpinned by the ‘right tree for the right place’ philosophy. Put simply, this aims to ensure the species selected for planting within a particular street can perform appropriately given the overall context and environmental conditions of its planting site, maximising the delivery of community benefits while minimising tree establishment, management and maintenance costs.

The first stage in the application of this philosophy is to put in place all practical measures that will help to maximise the growing conditions at each planting site, as described in Part One of this guide.

Individual trees are then assessed against a wide range of selection criteria that aim to ensure that the species chosen is the best fit for the particular street it is to be planted in.

To help simplify the selection process the City uses a tiered approach which ranks these criteria in order of importance (see Figure 1).
Primary criteria
The most important issue to consider in the tree selection process is the ability of a particular species to survive and thrive despite the harsh growing conditions that exist in city streets. This is assessed by a species:

- past performance as a street tree
- ability to adapt to the urban environment.

PAST PERFORMANCE
One of the best strategies for successful tree selection is to assess how well existing species are performing within city streets.

The City has reviewed the performance of its existing population of street trees using data on tree health and useful life expectancy collected for the development of the Urban Forest Plan. Where a particular tree is commonly found within an individual city street, and is performing well against desired selection criteria, the general strategy is to continue to plant that species as part of new and replacement plantings.

This approach does not, however, mean that existing street trees that do not match the chosen species will be removed. Many city streets currently contain a mix of tree species. Where trees other than the chosen species are found to be healthy, making a positive contribution to the streetscape, they will be retained.
ADAPTABILITY
To be successful, street trees must have the ability to adapt and thrive despite the range of common challenges described below.

Urban microclimate
The surrounding built environment can create a challenging microclimate within city streets.

Street trees must be able to withstand much higher temperatures due to the impact of the Urban Heat Island (UHI) effect. This is particularly important in Perth given that the City is predicted to experience rising temperatures in the future.

Surrounding high rise buildings can also create wind tunnels and result in extended periods of shade. This can have a negative effect on a tree’s crown form, quality and health.

Air pollution
City streets can experience higher levels of atmospheric pollution, particularly where there is a significant amount of vehicular traffic.

Trees can help reduce levels of air pollution by absorbing pollutants through the leaf surface. Recent research indicates that some of the key traits that can influence a tree’s effectiveness in reducing air pollution include the size and health of its canopy, foliage density, leaf size, the length of its in-leaf period and micro characteristics such as leaf hairiness.

Poor and compacted soils
Urban soils are often extremely disturbed, resulting in low nutrient content and water holding capacity.

Paved and impermeable urban surfaces can also compact the soil and limit levels of oxygen and gas exchange. In some parts of the city, particularly those around the river or where ancient wetlands have been infilled, the soils can be susceptible to waterlogging during periods of prolonged rainfall, leading to soil hypoxia.

Tree roots cannot grow in hard, compacted soils where no oxygen is available. This can be a leading cause of tree death in the urban environment.

Impacts of climate change
Street trees also have to increasingly contend with reduced rainfall associated with on-going climate change.

This is already suspected of having an impact on the health of a few of the City’s existing street tree species. These include a large number of mature Lophostemon confertus (Queensland Box), one of the most commonly planted street trees in the city, and some fig trees such as the Ficus macrophylla (Moreton Bay Fig) and Ficus obliqua (Small Leaved Fig), which are more habitually found in rainforest areas.
Secondary criteria

In the next level of assessment each tree species is assessed against its potential to:

- deliver green infrastructure benefits appropriate to its context
- minimise on-going management and maintenance costs
- improve species diversity and levels of resilience within the urban forest.
GREEN INFRASTRUCTURE BENEFITS

Green infrastructure benefits (GI benefits) are the range of environmental, social and economic services provided by healthy, mature street trees. Tree species differ in their ability to deliver these benefits. It is important the selection process ensures that the species chosen delivers the specific benefits required in a particular street and its surroundings.

The key GI benefits informing the City’s tree selection process include:

**Urban cooling**
Levels of shade and evapotranspiration provided by a tree’s canopy help to cool city streets and buildings. Research undertaken for the development of the Urban Forest Plan suggests that large canopied, broad leaved trees with dense crowns are the most effective.

These trees tend to be non-native species. In some instances, these trees are also often better adapted to thrive in challenging urban environments.

**Water quality and management**
Trees capture and filter stormwater through their canopies and root systems. This can help to slow flow rates, reduce levels of stormwater run off and improve water quality. Some tree species are more effective than others in this regard.

**Biodiversity**
Tree canopies provide shelter for birds, bees and other wildlife. Their fruit and flowers can be an important food source.

Native trees are often selected for their ability to create habitat and support biodiversity in appropriate locations. However, some non-native tree species including *Jacaranda mimosifolia* (Jacaranda), *Liquidambar styraciflua* (Liquidambar) and *Pinus pinea* (Stone Pine) can also help to support native fauna, with their seeds providing a food source for Carnaby’s Black Cockatoo.

**Beautifying city streets and spaces**
Trees can soften and humanise city streets, adding colour, scent, sound and visual interest across the seasons. This helps to create comfortable and inviting streets, encouraging people to walk through and use these spaces to enjoy city life. Increased levels of pedestrian activity can also help to improve people’s perceptions of safety.

Qualities such as tree size, its overall form and structure, the colour and quality of bark foliage and the provision of seasonal fruit or flowers can have a significant aesthetic impact on city streetscapes. They are important considerations in the tree selection process.
FUNCTIONALITY

Each tree species is assessed against a range of individual characteristics and qualities that are likely to impact on how successfully it can function in the context of the overall street environment and the range of activities that take place there.

This level of assessment helps to determine whether or not the species chosen will have an overall positive impact on the street environment while also managing their establishment and maintenance costs.

Size

A tree’s canopy and root systems have to compete for space against other elements of city infrastructure including buildings, awnings, light poles, street furniture and underground services, and functions such as vehicle and pedestrian movement.

Due to the relationship between tree canopy and the level of GI benefits delivered, the City generally favours the selection of tree species with the potential to develop as large and as healthy a canopy as possible.

However, the selection process must also strike a balance between canopy size and the space that is available within the street. Oversized trees can have a negative impact on other city infrastructure and accessibility, making them costly to manage and maintain.

The rate at which a particular species grows is also considered in the selection process and particularly slow growing species are generally avoided.

Structure

Street trees should have good structure and symmetrical form, which is relatively consistent across the species. This can add a sense of formality to a streetscape, whereas species with a more irregular structure and open, asymmetrical form tend to create more informal and naturalistic landscapes.

The trunks of trees should ideally be single (i.e. not multi-branching) and relatively straight so they take up minimal footpath space, and the area around the tree is maximised.

In high use city streets, trees should also be high branching and tolerant of pruning. This will allow for safe and comfortable pedestrian movement and the passage of large vehicles. It will also help create clear views of signage and traffic signals and the non-obstruction of street lighting where these elements cannot be successfully relocated.

Leaf and fruit litter

All trees produce litter; leaf or bark shed, fruit or seed drop.

Rather than avoiding the use of these trees, the City’s approach is to put appropriate procedures in place to manage tree litter, especially in streets and spaces with high levels of activity. This will minimise any risk to pedestrians and cyclists and help keep city streets clean and tidy.

Planting tree species that produce leaf and fruit litter at similar times of the year within close proximity to each other can help to reduce the cost of tree maintenance.

If a particular species produces a higher level of litter but performs well against most of the other selection criteria, particularly canopy cover, the City will generally continue to plant it.
Limb drop
This is a natural event for most trees and despite proper risk management and monitoring it is not always possible to predict or avoid it.

To minimise this risk, tree species which are known for their relatively high rate of limb failure will generally not be considered for planting in streets or other public spaces where pedestrian and/or cyclist activity is high.

In areas where such species already exist the City undertakes appropriate measures for their management and maintenance.

Roots
Root disturbance to pavements and other infrastructure can generally be managed with appropriate site preparation at each planting site.

As trees grow bigger the chances of some root disturbance can also increase. Where the roots of an existing tree are disturbing footpaths or roads these will be managed on a case by case basis, using expert arboricultural advice where needed.

Species known to have vigorous and/or buttress root systems that lift pavements will generally not be selected.

Pests and diseases
Healthy trees are generally resilient to the impact of pests and diseases. However, the urban environment and climate change can stress street trees making them vulnerable to attack.

While the City’s street trees are generally in good health some species are currently affected by various pests and diseases. However, these do not appear to be having a detrimental effect on health at present.

The City’s approach is to continue to use these species, particularly where they are likely to recover with appropriate treatment.

Where treatment proves to be inefficient or ineffective the continued use of these species will be re-evaluated in future updates of this guide.

Availability
Trees selected for planting should generally be readily and locally available in the size and quantities required. This is particularly important for tree species that will be planted widely across the city.
DIVERSITY AND RESILIENCE

A further complicating factor in the tree selection process is the limited number of tree species that can meet most of the selection criteria. This can result in the urban forest becoming over reliant on particular tree species which have proven their ability to perform within city streets.

It is important that the selection process includes the identification and assessment of new tree species that have the potential to be used as street trees in the future. This will help promote species diversity and the long-term health and resilience of the urban forest.

No tree is perfect

Trees are living organisms and there will be inconsistencies within species, problems associated with their growth, tree litter and other maintenance issues. No tree is ‘perfect’ and it is not possible for one species to meet all the City’s selection criteria or community preferences.

Figure 2: Qualities of a good street tree.
Street tree trials

Street tree trials have an important role to play in improving species diversity and resilience within the street tree population.

The City has identified a number of new tree species which have the potential to be used as street trees. These trial species have been chosen based on an assessment of their individual characteristics and qualities against current growing conditions within city streets, or because they currently grow well in climates similar to Perth.

Trials will generally be conducted by planting limited numbers of the trial species within groups of existing street trees or in smaller, less heavily used city streets. This will help to minimise the impact of any tree failures.

Trial trees will be planted into parks or grass verge areas first. If they are successful in these softscape locations they will be trialled again in paved footpath areas, as these locations are the most challenging growing environments.

Each tree will be assessed at regular intervals to measure and monitor its performance during all stages of the trial process. Successful species will be added to the City’s tree list and planted more widely across the street network as part of future planting programs.

As part of the trial process the City will also engage with other local governments within the greater Perth region to share any knowledge gained from the trial process and learn from the experience of others.

An initial list of tree trial species is shown in Appendix A. This list will be added to periodically as additional species are identified from on-going research.

Sourcing tree species to trial

It can often be difficult to source trial species. Local nurseries generally only stock trees that are proven performers and have a guaranteed demand.

Quarantine processes and restrictions can further complicate species availability.

To address this issue the City will form partnerships with selected nurseries so that contract growing of selected trial species can be undertaken.

The City’s tree list

The list of trees currently approved for use as street trees by the City is included in Appendix B. It is divided into native and non-native species.

The list will be reviewed and amended periodically to take account of any impacts of climate change or other environmental issues on tree performance and health. These impacts will be identified as part of regular audits of the City’s street and parkland trees.

The list will also be updated to include new tree species identified as a result of tree trials.

Tree species in the City’s parks, reserves and gardens

Trees in parks or garden settings generally have far more favourable growing conditions than those within streets or other hard paved areas.

There can be greater flexibility in the choice of tree species to be planted in these softer areas and suitable species may not be restricted to those included on the City’s tree list. However, the tree selection process must always be determined by the planting context.
Selecting the right tree is not enough

While appropriate site preparation and the selection of the ‘right tree for the right place’ are important places to start, there are other issues that must be considered to maximise a street tree’s potential to grow and thrive. These include:

- procurement of quality tree stock
- implementation of best practice planting procedures and processes
- appropriate tree establishment and aftercare practices.

These issues are addressed in Part Three of this guide.