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1 EXECUTIVE SUMMARY

Background
Burwood Council’s Street Tree Management Strategy (The Strategy) provides a framework for the management of street trees within the Burwood Local Government Area.

The Strategy was prepared after a study of key issues and community consultation between July 2002 and September 2003. The original Strategy (Version 1) was prepared by Pittendrigh Shinkfield Bruce Pty Ltd (PSB) in 2004 for Burwood Council. The original Strategy was adopted by Council on 4 May 2004.

The Strategy was subsequently reviewed and revised by Burwood Council staff in 2012 and 2013 (this document, Version 2). The essence of the original Strategy in response to the community consultation has been retained, although technical and industry best practice information has been updated.

The Strategy (this document) supersedes all previous plans and manuals relating to street tree management in the Local Government Area of Burwood.

Ancillary to The Strategy is the Street Tree Technical Procedures. Council’s tree management staff have developed a set of Street Tree Technical Procedures, consistent with arboricultural best practice, to assist in the implementation and administration of The Strategy. The Street Tree Technical Procedures do not form part of this document.

Date of Adoption
The Strategy (this document) was adopted by Council on 18 November 2013 (Resolution number 177/13).

Objectives of the Strategy
The Strategy was prepared to achieve a series of objectives, which may be summarised as:

- maximise the beneficial aspects of trees in the streetscape
- minimise the potential risk of damage to property, personal injury, and conflicts with utilities
- rationalise street tree management within the Local Government Area
- involve the public in the decision making process and extend community awareness of street tree policies and practices.

Review
- This document is intended to be reviewed every four years.
2 INTRODUCTION

2.1 BACKGROUND
Burwood Council has approximately 7,200 street trees within the Local Government Area. This equates to over 1,000 trees per square kilometre. Street trees constitute an important element of the rich cultural heritage of Burwood and a considerable asset to the community on many levels. Trees enhance our enjoyment of streets by making them more comfortable and pleasant, as well as providing a wide range of other benefits such as shade and habitat for wildlife.

In August 2002, Council commissioned Pittendrigh Shinkfield Bruce (PSB) to prepare a Street Tree Management Strategy which was adopted 4 May 2004 following public exhibition. The Strategy applies to all trees within public road reserves in the Local Government Area of Burwood. The Strategy was reviewed and edited by Council staff in 2012 and 2013. Council wishes to acknowledge PSB as the original authors of this document.

Burwood Council has reviewed The Strategy and manages and protects its street tree assets to minimise risk to property and personal safety, while maximising the benefits of street trees to the community and the environment.

2.2 PURPOSE OF THE STRATEGY
The purpose of The Strategy is to provide a management framework that will lead to the effective and co-ordinated management of street trees in the Local Government Area.

The aim of The Strategy is to maximise the benefits of street trees, and minimise the risks associated with them (such as damage to property or personal injury).

The Strategy is not a static document, and will require periodic reviews to ensure that it remains current. A comprehensive review of the document is considered necessary after a period of four years, in accordance with Council policy.

2.3 OBJECTIVES OF THE STRATEGY
This document provides a strategic and transparent strategy for the management of Council's street trees that will address the following primary objectives:

- maximise the beneficial aspects of trees in the streetscape
- minimise the potential risk of damage to property
- minimise the potential risk of personal injury resulting from affected public infrastructure
- minimise conflicts between utilities
- rationalise street tree management within the Local Government Area
- develop a consultative process for involving the public in the decision making process and extending community awareness of Council’s street tree policies and practices.

In addition, the Strategy takes account of the following needs:

- conserve and enhance the amenity and heritage created by trees in the public domain
- minimise/reduce the risk to people, property and infrastructure from existing trees and those planted in the future
- Council’s legal responsibilities in regard to its trees
- provide a rational tree planting and replacement policy that addresses management, safety, cost and liability constraints
- extend community awareness of and support for a policy that addresses these issues.
3 DEVELOPMENT OF THE STRATEGY

3.1 PREPARATION OF THE ORIGINAL STRATEGY (VERSION 1)

In 2002 and 2003 the draft Strategy was reviewed in consultation with Council officers, Councillors and members of the community. Tasks carried out included:

Stage 1: Review and Summary of Issues
- Review of all Council information and documentation on street trees
- Field review of problems caused by street trees
- Review of legal advice
- Summary of the findings
- Preparation of an interim report to Council’s Project Management Team and feedback

Stage 2: Consultations and Preparation of the Strategy

Consultations with the community involved a mail back questionnaire included with Council’s rates notice distributed to 10,000 rateable properties within the Burwood Local Government Area. A further 5,000 questionnaires were made available at Council run activities, and from Council’s office. A public community workshop was also conducted.

The objective of consulting the community was to find out what was considered important about street trees within the Local Government Area, and how they should be managed in the future. The feedback from the community is summarised in section 3.2, and has been incorporated into this Strategy.

The draft Strategy was prepared in response to the requirements detailed in Council’s original brief to the consultant including:

- actions to reduce the existing risks and problems
- a strategy for the management of existing street trees, and planting of future street trees
- a policy for Council to address third party claims
- identification of appropriate amendments to Council’s Tree Manual (superseded)
- a review of the Street Tree Master Plan (superseded)
- actions for short and long term tree maintenance, removal and replacement to maintain health and reduce hazards
- a description of how the public will be informed about respective responsibilities and how third party claims will be assessed
- procedures for the selection and planting of street trees and the minimisation of risks
- specific strategies for street trees in a series of streets identified in appendix 1 of Council’s original brief.

3.2 ISSUES IDENTIFIED THROUGH THE INITIAL COMMUNITY CONSULTATION

The results of the questionnaire indicate that the main management issues for street trees in the Local Government Area are:

- that there are not enough street trees in Burwood
- tree species suitability
- replacement of street trees that have been removed
- safe enjoyment of street trees
Issues mentioned by a marginal or less than significant number of the respondents were:

- after planting care and maintenance of street trees
- tree debris
- damage caused by street trees

Other street tree management issues mentioned by the respondents were:

- lack of consistent species
- desire for a mixture of tree heights (small, medium and large)
- the hazard of branches overhanging footpaths
- vandalism of trees
- native species
- the relocation of services underground so that larger trees can be planted
- visibility – especially reduced by shrubs
- resident input into species selection
- replacement of large trees under powerlines with smaller trees

In addition to the questionnaire analysis, a Community Working Party meeting was held with interested residents, to explore the community’s values, issues and concerns in relation to Burwood’s street trees. The meeting was held on 10 October 2002, and eight residents attended.

The key issues discussed at the meeting were:

- overhead wires, and their impact on the appearance of street trees following power line clearance pruning
- species selection
- street tree replacement, following removal, and the identification of new street tree planting opportunities
- communication with the community about street tree works

The pruning of street trees away from above ground electricity wires was an issue of great interest. Engineering solutions to above ground wires, such as aerial bundled cables and the relocation of electricity wires to below ground were discussed.

The members of the Working Party indicated that they aspired in the future towards trees that were efficiently managed, and were capable of providing shade and a visually appealing streetscape.

3.3 VALUES

The results of the questionnaire indicate that street trees are important to people in the Local Government Area because they:

- add character to a street
- protect and enhance the environment
- provide important habitat for wildlife
- enhance the privacy of private property
- provide shade

A variety of other street trees values were mentioned by the respondents, including that street trees:
• instil a ‘pride of place’
• screen and soften impact of development
• distract eye from ugliness of wires, poles, concrete
• are beautiful and precious
• add life to a street
• have colour, scent
• have a calming effect
• make one feel good
• provide contact with nature
• create a safer, better environment
• make it pleasurable to walk/drive through tree lined streets
• increase the atmosphere of the area
• have potential to be used as part of a comprehensive traffic calming strategy
• absorb dust and traffic noise

A low number of respondents (4%) indicated that street trees were not important. These respondents cited the following reasons:

• repair of damage caused by street trees is too costly to the ratepayer
• pruning under powerlines makes them ugly
• they are dangerous
• fallen leaves are messy and clog drains

3.4 OUTCOMES
Overall, 394 responses to the questionnaire were received, which equates to a response rate of about 3.1% (the typical response rate to questionnaires is about 3%). The highest response by street name was 3%, received from residents of Burwood Road and Wentworth Road, a regional road and a collector road, which indicates that an interest in street tree issues is shared across the Local Government Area, and is not street specific.

4 EXISTING CONTROLS/POLICIES
Burwood Council’s street trees are currently subject to a variety of controls and policies. This section of The Strategy provides an overview of these and explores opportunities to maximise the benefits and minimise the risks of street trees in Burwood through the provisions of the statutory framework and Council’s policies and practices with regard to recording, selection, protection, maintenance and replacement of street trees.

4.1 STATUTORY FRAMEWORK
The statutory framework that applies to street trees in Burwood is comprised of the following:

• Burwood Local Environmental Plan (2012)
• Burwood Development Control Plan (2013)
• Burwood Council Landscaping Code (2010)
• Tree Safety Management Plan (Ausgrid, 2007)
• Street Tree Management Strategy (this document)

Burwood Local Environmental Plan (2012)
Clause 5.9 of the Burwood Local Environmental Plan (BLEP) 2012 protects trees by making it an offence to ringbark, cut down, top, lop, remove, injure or wilfully destroy any tree or other
vegetation to which a Development Control Plan applies without authority conferred by either a development consent or a permit granted by Council. A list of all Heritage Items and Heritage Conservation Areas in the Burwood Local Government Area is available in the BLEP. The BLEP and DCP accord with this Street Tree Management Strategy, to provide planting conditions that maximise the potential for medium to tall street trees.

**Burwood Development Control Plan (2013)**

Section 6.1 (Preservation of Trees or Vegetation) of Burwood Council’s Development Control Plan (DCP) applies to all trees within the Local Government Area of Burwood, including street trees. The DCP provides the dimensions that a tree must have for it to be protected. All protected trees require the consent of Council before they can be pruned or removed.

**Burwood Council Landscaping Code (2010)**

The purpose of the Landscaping Code is to raise awareness of the aesthetic, functional and environmental benefits of landscaping. The Code provides guidelines for the preparation of Landscape Plans as an integral component of new development in Burwood. The Code was revised in 2010.

**Tree Safety Management Plan (Ausgrid, 2007)**

The Ausgrid Tree Safety Management Plan provides guidelines on vegetation management under power lines for use by councils, public and private landowners and others. Advice on types of vegetation that are suitable and unsuitable for planting near overhead services is provided. In this plan only low growing species are recommended for use under power lines.

The Tree Safety Management Plan also provides information on the Network Standard Vegetation Safety Clearances around streetlights, aerial bundled cabling, poles, and conductors and states the requirements for contractors, councils and other managers.

The Ausgrid list of ‘unsuitable trees’ contains species that can be directionally pruned around wires, and that are suitable for planting under power lines, provided a commitment to such pruning is made. Council will assess the financial feasibility of installing aerial bundled cabling in areas where existing mature trees are causing interference so that existing streetscape character and amenity can be maintained. Council will also consider the financial viability of the installation of underground electrical networking in urban renewal streetscape projects.

4.2 REVIEW OF COUNCIL’S CONTROLS AND POLICIES

All Council policies, codes, controls and procedural documents are comprehensively reviewed every four years.

5 STRATEGIES FOR STREET TREE MANAGEMENT

Following research of Council’s policies and practices and the community consultation process, including the issues and values identified therein, a series of strategies for management of street trees in Burwood have been formulated to balance the benefits of trees with tree management issues. These strategies are described in this section.

5.1 STREET TREE DATABASE

To successfully manage street tree assets it is fundamental to have a Street Tree Database. Council’s current street tree and maintenance databases should be updated, subject to Council
resources and budget, and amalgamated into a single database that is consistently used by all Council officers concerned with any aspect of street tree maintenance and management.

Council has developed the Street Tree Database, using the recommended fields in Table 1, as a minimum guide so that the data:

- can be used to determine maintenance responses
- can help identify new tree planting opportunities
- can help identify more suitable replacement species, where tree replacement is required
- applies standard arboricultural terminology

Table 1 forms the basis of the Burwood Council Street Tree Database. The current Burwood Council Street Tree Database and the Maintenance Database already contain most of the data. Fields may be added to or removed from the database, according to the requirements of Council’s Tree Management Officer.

**Explanation and definitions of the terms used in Table 1:**

<table>
<thead>
<tr>
<th>Table 1 Field</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ID number</td>
<td>To be determined by the Tree Surveyor.</td>
</tr>
<tr>
<td>2. Street Name 1</td>
<td></td>
</tr>
<tr>
<td>3. Street Name 2</td>
<td></td>
</tr>
<tr>
<td>4. Property Number</td>
<td></td>
</tr>
<tr>
<td>5. Suburb</td>
<td></td>
</tr>
<tr>
<td>6. Street Side Orientation</td>
<td>‘Street Side Orientation’ is the side of the street that the tree is located. For instance, on a predominantly east–west street, such as Nicholson Street, street trees may be located on the north or south side of the street. The Tree Surveyor may elect to plant deciduous trees on the southern side of the street to maximise solar access in winter.</td>
</tr>
<tr>
<td>7. Tree Location</td>
<td>To be determined by the Tree Surveyor. This field applies to both existing street trees, and the future location of a street tree, if there is a ‘Planting Opportunity’.</td>
</tr>
<tr>
<td>8. Tree Location Width</td>
<td></td>
</tr>
<tr>
<td>9. Powerlines</td>
<td>Footpaths &lt;1600mm wide are not suitable for street tree planting squares.</td>
</tr>
<tr>
<td>10. Species</td>
<td>To be determined by the Tree Surveyor.</td>
</tr>
<tr>
<td>11. Age</td>
<td>The age classes are defined as follows:</td>
</tr>
<tr>
<td></td>
<td><strong>Young:</strong> &lt; 5 years</td>
</tr>
<tr>
<td></td>
<td><strong>Semi-mature:</strong> a tree of intermediate height, before maturity</td>
</tr>
<tr>
<td></td>
<td><strong>Mature:</strong> a tree of mature height for that species</td>
</tr>
<tr>
<td></td>
<td><strong>Over-mature:</strong> a tree in the final 20% of its lifespan</td>
</tr>
<tr>
<td>12. Safe Useful Life Expectancy (SULE) rating</td>
<td>SULE ratings of all street trees in the Local Government Area are to be assessed independently as a separate exercise and information fed into the database.</td>
</tr>
<tr>
<td>13. Height (m)</td>
<td>To be determined by the Tree Surveyor.</td>
</tr>
<tr>
<td>14. Spread (m)</td>
<td></td>
</tr>
<tr>
<td>15. Trunk DBH (mm)</td>
<td></td>
</tr>
<tr>
<td>16. Condition</td>
<td><strong>Good:</strong> a tree in good health, and does not require any further action. A healthy, vigorous tree, reasonably free of signs and symptoms of disease, with good structure and form typical of</td>
</tr>
<tr>
<td>Table 1 Field</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Field</td>
<td>Definition</td>
</tr>
<tr>
<td>17. Footpath Damage (mm)</td>
<td>To be determined by the Street Tree Surveyor.</td>
</tr>
<tr>
<td>18. Kerb Damage (mm)</td>
<td></td>
</tr>
<tr>
<td>19. Planting Opportunity</td>
<td><strong>Yes</strong>: if:</td>
</tr>
<tr>
<td></td>
<td>− the site satisfies the requirements identified in Table 2, there is enough room to accommodate a street tree, and there is no street tree present; OR</td>
</tr>
<tr>
<td></td>
<td>− trees are removed and the site satisfies the criteria in Table 2.</td>
</tr>
<tr>
<td>20. Replacement species</td>
<td>Replacement species should be determined by the Tree Surveyor, after having regard for the site conditions.</td>
</tr>
<tr>
<td></td>
<td>Replacement species should be determined by referring to Table 2.</td>
</tr>
<tr>
<td>21. Root barrier</td>
<td>Whether a root barrier had been installed or not, at the time of carrying out the survey.</td>
</tr>
<tr>
<td>22. Recommendation</td>
<td><strong>Prune</strong> if the tree has a dead or hazardous limb (including low branches), is in conflict with a building or other structure, or requires sight line clearance</td>
</tr>
<tr>
<td></td>
<td><strong>Remove</strong> if the tree has been classified as ‘Over Mature’ or ‘Dead’ or if the tree species is not sustainable in its location and other risk management strategies are not feasible</td>
</tr>
<tr>
<td></td>
<td><strong>Replace</strong> if a tree has been removed and the site has been assessed to be suitable for a street tree</td>
</tr>
<tr>
<td></td>
<td><strong>Surface repair</strong> if a trip hazard is evident</td>
</tr>
<tr>
<td></td>
<td><strong>Install root control barrier</strong> if the preliminary works have determined that this action is recommended</td>
</tr>
<tr>
<td></td>
<td><strong>Maintain root control barrier</strong> if tree roots have grown over the top of the barrier</td>
</tr>
<tr>
<td></td>
<td><strong>Nil</strong> is no action required</td>
</tr>
<tr>
<td>23. Planting Date</td>
<td>Record date of works</td>
</tr>
<tr>
<td>24. Removal Date</td>
<td>Record reason for tree removal</td>
</tr>
<tr>
<td>25. Removal Reason</td>
<td>Record date of works or inspection</td>
</tr>
<tr>
<td>26. Stump Removal Date</td>
<td>Record date of works or inspection</td>
</tr>
<tr>
<td>27. Prune Date</td>
<td></td>
</tr>
<tr>
<td>28. Inspection Date</td>
<td></td>
</tr>
<tr>
<td>29. Comments</td>
<td>Memo field to record notes on works carried out on tree, issues associated with tree, or other matters pertaining to tree.</td>
</tr>
</tbody>
</table>
### Table 1: Burwood Council Street Tree Database

<table>
<thead>
<tr>
<th>Field</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ID number</td>
<td>(insert ID number, as appropriate)</td>
</tr>
<tr>
<td>2. Street Name 1</td>
<td>(insert principal street name, as appropriate)</td>
</tr>
<tr>
<td>3. Street Name 2</td>
<td>(insert secondary street name, as appropriate)</td>
</tr>
<tr>
<td>4. Property Number</td>
<td>(insert property number, as appropriate)</td>
</tr>
<tr>
<td>5. Suburb</td>
<td>(insert suburb, as appropriate)</td>
</tr>
<tr>
<td>6. Street Side Orientation</td>
<td>N, S, E, W</td>
</tr>
<tr>
<td>7. Tree Location</td>
<td>Footpath &lt;1600mm</td>
</tr>
<tr>
<td></td>
<td>Footpath &gt; or = 1600mm</td>
</tr>
<tr>
<td></td>
<td>Nature strip</td>
</tr>
<tr>
<td></td>
<td>Road shoulder</td>
</tr>
<tr>
<td>8. Tree Location Width (mm)</td>
<td>Solid hardstand (saw cutting required)</td>
</tr>
<tr>
<td></td>
<td>Tree planting square &lt;600 wide x 1000 long</td>
</tr>
<tr>
<td></td>
<td>Tree planting square &gt;600 wide x 1000 long</td>
</tr>
<tr>
<td></td>
<td>Nature strip &lt;1000</td>
</tr>
<tr>
<td></td>
<td>Nature strip 1000 - 1500</td>
</tr>
<tr>
<td></td>
<td>Nature strip 1500 – 3000</td>
</tr>
<tr>
<td></td>
<td>Nature strip &gt;3000</td>
</tr>
<tr>
<td>9. Powerlines</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>10. Species</td>
<td>(insert the botanical name of the existing species, as appropriate or ‘Nil’ if no tree exists)</td>
</tr>
<tr>
<td>11. Age</td>
<td>Young</td>
</tr>
<tr>
<td></td>
<td>Semi-mature</td>
</tr>
<tr>
<td></td>
<td>Mature</td>
</tr>
<tr>
<td></td>
<td>Over-mature</td>
</tr>
<tr>
<td>12. Safe Useful Life Expectancy (SULE)</td>
<td>SULE rating to be assessed independently and inserted here</td>
</tr>
<tr>
<td>13. Height (m)</td>
<td>(specify height in metres)</td>
</tr>
<tr>
<td>14. Spread (m)</td>
<td>(specify spread in metres)</td>
</tr>
<tr>
<td>15. DBH - Trunk diameter at 1.4m above ground (mm)</td>
<td>100, 200, 300, 400, 500, 600 or &gt;600</td>
</tr>
<tr>
<td>16. Condition</td>
<td>Good (no action)</td>
</tr>
<tr>
<td></td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td>Over mature</td>
</tr>
<tr>
<td></td>
<td>Dead</td>
</tr>
<tr>
<td>17. Footpath Damage (mm)</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>0-20</td>
</tr>
<tr>
<td></td>
<td>&gt; 40</td>
</tr>
<tr>
<td>18. Kerb Damage (mm)</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>0-20</td>
</tr>
<tr>
<td></td>
<td>&gt; 40</td>
</tr>
<tr>
<td>19. Planting Opportunity</td>
<td>This field will show whether an opportunity for tree planting exists: Yes or No</td>
</tr>
<tr>
<td>20. Replacement species</td>
<td>Insert the botanical name of the replacement species</td>
</tr>
<tr>
<td>21. Root barrier</td>
<td>Installed or not installed</td>
</tr>
<tr>
<td>22. Recommendation</td>
<td>Prune</td>
</tr>
<tr>
<td></td>
<td>Remove</td>
</tr>
<tr>
<td></td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Surface repair</td>
</tr>
<tr>
<td></td>
<td>Modular root management cell systems</td>
</tr>
<tr>
<td></td>
<td>Install root control barrier</td>
</tr>
<tr>
<td></td>
<td>Maintain root control barrier</td>
</tr>
</tbody>
</table>
### 5.2 GUIDING PRINCIPLES FOR STREET TREE PLANTING

**Prioritising Planting**

It is important to identify existing and new street tree planting opportunities. In doing so, consideration is given to the preparation of a prioritised Street Tree Planting Program, with achievable annual targets. Priority is given to:

- the replacement of trees that have been removed in the past, especially where part of an avenue of trees or in a heritage conservation area;
- unimpeded spaces with few trees in the vicinity; and
- high profile/highly utilised areas.

**Planting Provisions**

At the time of planning major engineering works, available space for street trees in the road shoulder or nature strip should be maximised by including the following street tree planting provisions (as applicable):

- Common services trenches
- Design of service easements or conduits to exclude tree roots
- Installation of structural soils or modular root cell systems
- Installation of commercially available tree root management systems
- Use of permeable surfaces
- Placing new below ground services a minimum of 2 metres away from street trees
- Relocation of above ground services to below ground
- Mulch

It is best to plant street trees in the cooler months, particularly at the end of summer. However, this is not always practical. Providing watering is carried out, street trees may be successfully established at any time during the year.

**Planting Opportunities**

Depending on circumstances, established patterns of street tree planting will be retained, which may include:

- single fronted dwellings with one street tree in front of each dwelling, or
- single fronted dwellings with small street trees in front of every second dwelling, or

<table>
<thead>
<tr>
<th>Field</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Planting Date</td>
<td>Date of planting</td>
</tr>
<tr>
<td>24. Removal Date</td>
<td>Date of tree removal</td>
</tr>
<tr>
<td>25. Removal Reason</td>
<td>Defective, Dead, Insurance, Other (describe)</td>
</tr>
<tr>
<td>26. Prune Date</td>
<td>Date of pruning works carried out</td>
</tr>
<tr>
<td>27. Inspection Date</td>
<td>Record date of inspection</td>
</tr>
<tr>
<td>29. Comments</td>
<td>Additional notes on works carried out on tree.</td>
</tr>
</tbody>
</table>

[Image 58x36 to 157x68]
- double fronted dwellings with one street tree in front of each dwelling, or two street trees in front of each dwelling

Established patterns of street tree planting are determined by observation. Some of the existing patterns may be clearly indicated by Council’s MapInfo system, whereas other streets may require site inspections to clarify the location of the existing trees.

Council will not recommend a Planting Opportunity if the site conditions, such as a building or other element, would overly interfere with the natural development of the street tree.

5.3 STREET TREE CONSTRAINTS

The physical space above and below ground that is available for street trees to grow is highly constrained. Above ground, tree development is limited by electricity wires, pedestrian pavements, kerbs, and roads. Below ground, the development of tree roots is constrained by a variety of services (gas, sewer, water, telephone & electricity), footings and property boundaries. Without proper planning and preventative measures, adverse interactions between street trees and other urban elements may arise. The Strategy aims to provide practical approaches that seek to avoid or mitigate the problems caused by street trees in Burwood, both in the short and long term.

In regard to tree selection and management, the key issues identified included:

- Species selection, to minimise damage caused by trees and tree roots to underground services, pavements, kerbs and third party property, and to take account of horticultural characteristics (such as vigour, fruit production, leaf drop, mature tree dimensions and growth habits of above and below ground parts)
- Power line clearance pruning, and the impact it has on the appearance of street trees
- Risk management, such as pruning and root control
- Street tree removal and replacement
- Vandalism of young trees

5.4 SPECIES SELECTION

Street trees have the potential to reduce the impact of development and instil a sense of unity in the otherwise complex array of built elements that make up our streetscapes. Community comment on street tree selection indicated that a variety of tree heights and species were desired across the Local Government Area, so that street trees can provide shade and visual diversity. Consistency of one or two species within individual streets was preferred. However, the community also identified that appropriate street tree species selection was a key management issue.

Appropriate species selection is undoubtedly the most cost effective way of reducing the potential for damage caused by trees in the built environment (Winstone, no date). Decisions about future tree species selection must be informed by the lessons learnt from past tree plantings. Many of the existing problems caused by street trees in the Local Government Area are the result of inappropriate species selection, particularly the conflict between mature tree dimensions and the built elements within their immediate environment. Street tree selection needs to be carried out in the context of location, horticultural characteristics and the availability of risk minimisation strategies.
Selection Criteria

The Street Tree Species Schedule (Table 2) is updated as needed to ensure that due regard is given to site conditions, horticultural suitability and existing streetscape character. Streetscape character is particularly important in heritage conservation areas and other areas where street trees are established and have a positive aesthetic impact on their environment.

Site conditions criteria include:

- Width of planting opportunity (nature strip/tree planting square/road shoulder/median strip)
- Soil depth and type
- Relationship to compass points (shade/sun)
- Street/avenue/highway
- Slow traffic/fast traffic
- Underground services
- Overhead obstructions/constraints
- Location of crossings/traffic lights
- Associated building types (hotels, schools)
- Pedestrian and vehicle usage and need for visibility
- Access for street cleaning equipment and garbage collection vehicles

Horticultural selection criteria include:

- Habit of growth
- Physical form
- Visibility around trunk and canopy
- Pollution tolerance
- Drought tolerance
- Growth rate/longevity
- Weed potential for urban bushland and private property
- Maintenance/creation of habitat and promotion of species diversity
- Tolerance of compacted soils (low aeration, poor drainage)

The Street Tree Database in Table 1 has been designed to capture the essential aspects of the above criteria, so that decisions about street tree selection can be made by matching the site conditions with a suitable species in the Street Tree Species Schedule in Table 2.

The implementation process pertaining to street tree selection is indicated in Council’s Street Tree Technical Procedures. For any given combination of site conditions, there are a number of additional factors that Council’s Tree Management Officer will take into consideration when selecting tree species. These factors include:

- Identifying the species that have performed well in similar sites elsewhere in the street or Local Government Area,
- Community feedback, and
- Existing character of the street.
5.5 STREET TREE SPECIES SCHEDULE

Notes for Table 2.

- All trees located in high or moderate risk zones may be planted with root control barriers at the Tree Management Officer’s determination.
- Tree planting squares (<1000mm x 1000mm) in footpaths are only suitable for small trees or shrubs.
- Nature strips <1000mm (between the kerb and foot path) are only suitable for small trees or shrubs.
- Trees should not be planted directly under electricity service lines to houses.
- Trees in this column are suitable for planting on the side of a street where there are no overhead powerlines (#).
- It is assumed that prior to using this table, the location of underground services and Dial-Before-You-Dig has been identified and a services diagram consulted in relation to street tree planting location.
- Aerial bundled cabling (ABC*).
- If an existing street tree planting is dominated by a tree species that is not listed below, Council may elect to continue to recommend the use of that species.
- All of the tree species in the table are considered to be hardy in all soil types that occur in the Burwood LGA. It is assumed that existing topsoils will be a minimum depth of 300mm, over clay subsoils to varying depths (minimum 600mm assumed). The species are tolerant of periods of drought stress, as well as poor drainage and low soil aeration levels. (Typical conditions for street trees).
- Evergreen/deciduous parameters to be taken into account regarding solar access to properties.
- All trees are suitable for mass planting in streets. However, the species that form impressive ‘avenues’ have been separately nominated. Avenue trees may be species that are significantly more long-lived, or have visual characteristics that make them a more suitable choice for a heritage conservation area.
<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
<th>Approx Mature Height</th>
<th>Evergreen or Deciduous</th>
<th>Street / Avenue / Highway</th>
<th>Overhead Impacts</th>
<th>Tree Location</th>
<th>Suitable for planting in shoulder of road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia binervia</td>
<td>Coastal myall</td>
<td>8</td>
<td>Evergreen</td>
<td>Street</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Acer buergeranum</td>
<td>Trident maple</td>
<td>8</td>
<td>Deciduous</td>
<td>Street</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Agonis flexuosa</td>
<td>Willow myrtle</td>
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<td>Evergreen</td>
<td>Street Avenue</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Albizia julibrissin</td>
<td>Silk Tree</td>
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<td>Deciduous</td>
<td>Street</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Archontophoenix cunninghamiana</td>
<td>Bangalow</td>
<td>10</td>
<td>Evergreen</td>
<td>Street Avenue</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Backhousia citriodora</td>
<td>Sweet verbena tree</td>
<td>6</td>
<td>Evergreen</td>
<td>Street Avenue</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Backhousia myrtifolia</td>
<td>Grey myrtle</td>
<td>6</td>
<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Banksia integriolia</td>
<td>Coastal banksia</td>
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<td>Evergreen</td>
<td>Street</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Bauhinia variegata</td>
<td>Orchid tree</td>
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<td>Evergreen</td>
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<td>Yes</td>
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<td>Buckinghamia celsissima</td>
<td>Ivory curl flower</td>
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<td>Evergreen</td>
<td>Street</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Butia capitata</td>
<td>Jelly palm</td>
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<td>Evergreen</td>
<td>Street Avenue</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Callistemon citrus</td>
<td>Lemon-scented bottlebrush</td>
<td>4</td>
<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Callistemon salignus</td>
<td>White bottlebrush</td>
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<td>Street</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Callistemon ‘Hannah Ray’</td>
<td>Weeping bottlebrush</td>
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<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Callistemon ‘Kings Park Special’</td>
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<td>Street</td>
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<tr>
<td>Chamaecyparissus obtusa ‘Crippsii’</td>
<td>Golden Hinoki cypress</td>
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<td>Evergreen</td>
<td>Street</td>
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<td>No</td>
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<tr>
<td>Corymbia maculata</td>
<td>Spotted gum</td>
<td>16</td>
<td>Evergreen</td>
<td>Street</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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</table>
Table 2 - Street Tree Species Schedule

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
<th>Approx Mature Height</th>
<th>Evergreen or Deciduous</th>
<th>Street / Avenue / Highway</th>
<th>Overhead Impacts</th>
<th>Tree Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cupaniopsis anacardioides</td>
<td>Tuckeroo</td>
<td>7</td>
<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Elaeocarpus reticulatus</td>
<td>Blueberry ash</td>
<td>10</td>
<td>Evergreen</td>
<td>Street</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Elaeocarpus eumundi</td>
<td>Smooth-leaf quandong</td>
<td>8-10</td>
<td>Evergreen</td>
<td>Street, Avenue</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Eucalyptus microcorys</td>
<td>Tallow wood</td>
<td>20</td>
<td>Evergreen</td>
<td>Avenue</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Eucalyptus sideroxyylon</td>
<td>Mugga ironbark</td>
<td>15</td>
<td>Evergreen</td>
<td>Street, Avenue</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Fraxinus excelsior ‘Aurea’</td>
<td>Golden European ash</td>
<td>9</td>
<td>Deciduous</td>
<td>Street, Avenue</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Fraxinus ‘Griffithii’</td>
<td>Evergreen ash</td>
<td>6</td>
<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Glochidion ferdinandii</td>
<td>Cheese tree</td>
<td>7</td>
<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Gordonia axillaris</td>
<td>Fried Egg Plant</td>
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<td>Yes</td>
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<tr>
<td>Grevillea ‘Honey Gem’</td>
<td>Honey gem</td>
<td>4</td>
<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Grevillea ‘Moonlight’</td>
<td>Moonlight</td>
<td>4</td>
<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Jacaranda mimosifolia</td>
<td>Jacaranda</td>
<td>12</td>
<td>Deciduous</td>
<td>Street, Highway</td>
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<tr>
<td>Jacksonia scoparia</td>
<td>Jackson’s bush</td>
<td>4</td>
<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Koelreuteria paniculata</td>
<td>Golden rain tree</td>
<td>9</td>
<td>Deciduous</td>
<td>Street</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Lagerstroemia indica</td>
<td>Crepe myrtle</td>
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<td>Deciduous</td>
<td>Street</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Leptospermum petersonii</td>
<td>Lemon-scented tea tree</td>
<td>6</td>
<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Table 2 - Street Tree Species Schedule

<table>
<thead>
<tr>
<th>Botanical Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Use under power lines, with little or no pruning required</td>
<td>Concrete footpath with &gt;1000mm x 1000mm opening for tree</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Able to be grown under power lines, with formative pruning</td>
<td>Minimum nature strip Grass or mulched planting strip (mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>#No power-lines</td>
<td>Suitable for planting in shoulder of road</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Able to be grown under and pruned around ABC*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Use under power lines, with little or no pruning required</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>#No power-lines</td>
<td></td>
</tr>
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<td></td>
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<td>Able to be grown under and pruned around ABC*</td>
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<td></td>
<td>#No power-lines</td>
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<td></td>
<td>#No power-lines</td>
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<td></td>
<td>Able to be grown under and pruned around ABC*</td>
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<td>Able to be grown under power lines, with formative pruning</td>
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<td>Able to be grown under and pruned around ABC*</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
<th>Approx Mature Height</th>
<th>Evergreen or Deciduous</th>
<th>Street / Avenue / Highway</th>
<th>Overhead Impacts</th>
<th>Tree Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livistona australis</td>
<td>Cabbage palm</td>
<td>10</td>
<td>Evergreen</td>
<td>Street Avenue</td>
<td>No</td>
<td>1500</td>
</tr>
<tr>
<td>Lophostemon confertus</td>
<td>Brush box</td>
<td>&gt;20</td>
<td>Evergreen</td>
<td>Street Avenue</td>
<td>No</td>
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<tr>
<td>Magnolia grandiflora</td>
<td>Dwarf Bull Bay</td>
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<td>Evergreen</td>
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<td>1000</td>
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<td>Magnolia x soulangiana</td>
<td>Saucer magnolia</td>
<td>6</td>
<td>Deciduous</td>
<td>Street</td>
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<td>&gt;1500</td>
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<tr>
<td>Melaleuca armillaris</td>
<td>Bracelet honey myrtle</td>
<td>4</td>
<td>Evergreen</td>
<td>Street</td>
<td>Yes</td>
<td>&gt;1500</td>
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<tr>
<td>Melaleuca bracteata</td>
<td>Revolution Green</td>
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<td>1000</td>
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<td>1000</td>
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<td>Photinia x fraseri</td>
<td>Chinese hawthorn</td>
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<td>&gt;1500</td>
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<td>Chinese pistachio</td>
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<td>Street</td>
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<td>1000</td>
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<td>Pittosporum rhombifolium</td>
<td>Queensland pittosporum</td>
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<td>Evergreen</td>
<td>Street</td>
<td>No</td>
<td>&gt;1500</td>
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<tr>
<td>Platanus digitata</td>
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<td>Avenue Highway</td>
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<td>&gt;3000</td>
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<tr>
<td>Platanus x hybrida</td>
<td>London plane</td>
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<td>Deciduous</td>
<td>Avenue Highway</td>
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<td>Pyrus calleryana</td>
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<td>&gt;3000</td>
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<tr>
<td>Quercus palustris</td>
<td>Pin oak</td>
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<td>Deciduous</td>
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<tr>
<td>Radermachera sinica</td>
<td>China doll</td>
<td>5-8</td>
<td>Evergreen</td>
<td>Street</td>
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<td>1000</td>
</tr>
<tr>
<td>Botanical Name</td>
<td>Common Name</td>
<td>Approx Mature Height</td>
<td>Evergreen or Deciduous</td>
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<td>Tree Location</td>
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<td>------------------------</td>
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<td>----------------------</td>
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<td>---------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tibouchina 'Alstonville'</td>
<td>Lasiandra</td>
<td>6</td>
<td>Evergreen</td>
<td>Street</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Tristaniopsis laurina</td>
<td>Water gum</td>
<td>9</td>
<td>Evergreen</td>
<td>Street</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Xanthostemon chrysanthus</td>
<td>Golden penda</td>
<td>9</td>
<td>Evergreen</td>
<td>Street</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
The diagrams above are indicative street sections with commonly used terms to describe typical street features.
5.6 TREE HEIGHT CONSIDERATIONS

An effective way of minimising the conflict between tree crowns and overhead obstructions, such as power lines, is to select only those species that do not grow taller than the height of the power lines, which are commonly between 6.0 to 8.0m tall. Species that have been modified through propagation or grafting onto dwarfing rootstocks are also useful for this purpose. This strategy is advocated by the Ausgrid ‘Tree Safety Management Plan’ (2007). While this strategy addresses the functional aspects of tree management, it comes at the expense of the benefits of tree height and scale. Limiting tree size to small trees across the LGA would not be a satisfactory solution, but it is a useful strategy for narrow streets. Tree height selection is used as one of a range of strategies within the Local Government Area to achieve visual diversity. Planting in the road shoulder of low speed roads has the potential to allow taller species to be planted.

5.7 STREET TREE REMOVAL AND REPLACEMENT

**Basis for Removal**

Street trees are generally less long lived than trees in their natural habitats because of the harsh environment in streets (Hitchmough 1994, p. 269). The removal of trees that have reached the end of their useful life expectancy is part of the tree management process, and requires consideration of community reaction.

Street tree removal is an inevitable and a necessary management strategy when a tree:

- has reached or is approaching the end of its life expectancy
- is structurally defective and has a high degree of risk for failure or collapse
- is causing damage to infrastructure where there is no permanent repair alternative option available

Street trees are not generally removed due to complaints regarding:

- dropping of leaves, flowers, fruit, cones, bark, twigs or other debris
- bird droppings
- insects
- shading
- loss of views

Requests to remove street trees on the basis of medical conditions will only be considered when a certificate from a registered medical specialist is produced to the effect that the tree in question is injurious to the health of the resident.

**Replacement Planning**

Tree replacement planning is part of the tree management process and should address the entire project and all aspects of the removal and replacement works. If tree replacement is proposed, it should occur as soon as practicable after the removal works, if not before removal, when site circumstances permit.

When planning large scale tree replacement works, the community will be advised in advance of the intended tree replacement species and locations. Providing residents with the opportunity to participate in the watering of the new trees in their street can help to foster a sense of community contribution and ownership in the successful establishment of the new trees.
Street Tree Management Strategy

Phasing a tree removal and replacement program over time will help to reduce the impact of mature tree loss, and promote a variety of age classes in the tree population. In these circumstances Council may remove groups of trees proportionate to the street at the determination of the Tree Management Officer.

It should be noted that the removal of every second or third tree has been trialled in the past without success. It has been found that new trees struggle to compete for light, nutrients and water with the existing trees, which leads to trees with poor form and structural defects.

The community considers street tree replacement a high priority, following tree removals. It should be clearly recognised by Council and the community that not all street trees should be replaced following their removal, as the site conditions may have changed since the previous planting. However, every endeavour is made to retain or increase the net number of street trees.

The Street Tree Species Schedule (Table 2) has been developed and is used in combination with the database, as a tool for selecting new street tree species.

Although historically certain street tree species have been found by Council to be unsuitable because of root interactions and other problems, these species may have other horticultural and streetscape character merit. Some of these species should be reconsidered with the use of appropriate root barriers, as determined by Council. Street tree planting opportunities exist following the removal of dead or structurally defective street trees and in locations that satisfy the street tree planting criteria.

New Streetscape Works Near Trees

Council considers existing street tree assets as onsite constraints and opportunities when designing and implementing streetscape works. The design of new streetscapes should include existing street trees where possible in the finished works. Any existing street trees included in the new works must be retained and protected according the Australian Standard (AS4970) for the Protection of Trees on Development Sites, 2009.

Existing street trees should only be removed if road or footpath realignment will not permit the sustainable retention of the street trees. Any street trees removed, as apart of the new works, shall be replaced as near as practicable to the location of those removed.

Emergency Tree Removal

Sometimes emergency tree removal is necessary. Subsequently, the emergency response time under these circumstances means that advanced notification of works will not always be possible. In this case, the immediate residents may be advised by door knocking at the time of the emergency works, depending upon the circumstances.

5.8 STRATEGIES FOR THE MAINTENANCE OF STREET TREES

Council carries out regular inspections of street trees in the Local Government Area, to identify hazards and maintenance works. The inspection procedure needs to be standardised and systematic.
Results of the arboricultural inspections are collected in Council’s Street Tree Database and will ideally generate a rolling program of strategic maintenance works, including recommendations on tree planting, replacement and pruning.

Consistent with the Australian Standard (AS4373) for the Pruning of Amenity Trees, 2007, and the WorkCover NSW Code of Practice for the Amenity Tree Industry, 1998, Council’s street tree maintenance will include but not be limited to:

- Removal and replacement
- New tree planting
- Fertilisation
- Watering
- Weed and insect pest control
- Pruning

5.9 PRUNING

In certain circumstances, pruning can be an effective way of reducing a number of risks that are a result of potentially hazardous branches, including:

- low branches near footpaths and roads
- dead branches or other limbs that are otherwise poorly attached (structural defects)
- storm damage
- branches within the safety clearance zones of electricity wires
- crown thinning prior to root pruning works
- sight line clearances for signs, traffic lights and street lights
- clearance to reduce interference with structures

Pruning is prioritised such that the trees with the highest hazard potential are attended to first. It should be noted that over pruning can have a detrimental affect on the health, structure and sustainability of a tree. All pruning must be carried out in accordance with the Australian Standard (AS4373) for the Pruning of Amenity Trees, 2007. Pruning of established trees must be minimalistic. Trees do not benefit from excessive pruning. The extent and type of pruning required will be determined by Council’s Tree Management Officer considering the location of the street tree, its species and its constraints.

Decisions about root pruning will be determined to avoid destabilisation or decline in the tree’s health as assessed by Council’s Tree Management Officer.

Pruning may be necessary to gradually lift the crown above the height of pedestrians and traffic, or to train branches around overhead wires. To promote sound branch structure, pruning or training of young trees must be incremental.

It should be noted that street trees are not generally pruned due to complaints regarding:

- dropping of leaves, flowers, fruit, cones, bark, twigs or other debris
- bird droppings
- insects
- shading
- loss of views
5.10 POWER LINE CLEARANCE PRUNING
Residents are often concerned with unsightly pruning outcomes from power line clearance pruning carried out by Ausgrid and its contractors. Pursuant to the *Electricity Supply Act*, 1995, Ausgrid has the authority to enforce clearances around their infrastructure to ensure a continuous electricity supply to its customers. It should be noted that Council does not carry out clearance pruning of bare overhead mains or aerial bundled cables.

The conflict between street trees and overhead power lines is perhaps one of the greatest limitations on street tree planting and development. In NSW, energy suppliers are responsible for the pruning of street trees around power lines. Trained personnel are contracted by the energy suppliers to carry out the pruning, because the pruning or removal of trees near power lines can be extremely dangerous. Pruning works within three metres of power lines should only ever be carried out by suitably qualified personnel and in accordance with the WorkCover NSW Code of Practice for the Amenity Tree Industry (Ausgrid, 2007).

The pruning is performed in accordance with the network standards for vegetation safety clearances. In Burwood’s residential streets, the vegetation safety clearances are (ibid.):

- 1.5m from low voltage bare overhead mains
- 0.5m from low voltage overhead aerial bundled cables (ABC)
- 0.5m from low voltage insulated service wires

The safety clearances have been determined to maximise the reliability of electricity supplies and to help prevent injury to people and damage to property (ibid.). However, clearance pruning can result in street trees having an unnatural appearance, particularly if the pruning results in a pronounced “V” shaped crown.

Strategies to reduce or eliminate the conflict between street trees and power lines are:

- tree height selection
- directional pruning (species suitable for formative pruning)
- pseudo street trees
- engineering solutions

5.11 DIRECTIONAL PRUNING
Some medium sized trees (7.0m – 15.0m) can be trained around overhead power lines to achieve aesthetically acceptable results. This strategy requires correct species selection and formative pruning when the tree is young. The aesthetic result of directional pruning is most successful when the safety clearances between the lines and the tree are minimal (see Engineering Solutions below). Table 2 provides a list of species that can be grown near powerlines, with pruning.

5.12 ENGINEERING SOLUTIONS

**Trees and Power Lines**
The impact on the appearance of street trees from electricity wire clearance pruning is not a satisfactory outcome. To address this impact, longer-term solutions are required. The engineering solutions that are available include:

- replacement of overhead wires with Aerial Bundled Cable
replacement of overhead wires with underground cables
relocating below ground services to provide more space for street tree planting in road shoulders or nature strips, including the use of structural soils or modular root cell systems

Council has previously installed Aerial Bundled Cables (ABC) in some streets with mature avenue plantings of trees. These streets are predominantly in heritage conservation areas. ABC allows reduced safety clearances compared with overhead wires, which benefits the appearance of street trees without compromising safety. ABC installation is expensive and can only be carried out as budgets permit. Council makes available annual funding for this project. This will allow many of the visual and functional problems posed by overhead wires to be largely eliminated without the impacts caused by the cutting of roots during the installation of underground cables adjacent to existing street trees.

Underground electricity is installed in all new urban residential developments. Most new high voltage wires are also placed underground, and in some commercial areas, overhead wires are placed underground in conjunction with building developments (Ausgrid, 2007). The Local Government Association unanimously supported the relocation of above ground wires to below ground within the Sydney Basin at its annual conference in 2001, and the State Government has also voiced its support for the proposal (Wainwright, 2001). The high cost of replacing above ground wires with below ground cables has meant that very few councils in Australia have carried out this work.

**Design of Roads and Footpaths**

An engineering solution for sustainable trees is the design of roads and footpaths to provide more space for street tree planting in road shoulders or nature strips. The use of common trenches for below ground services, and achieving compaction rates of 95% in service easements will reduce the incidence of damage to services. The installation of structural soils or modular root cell systems should also be given consideration, at the time of carrying out major road works.

The use of TripStop™ devices should be considered by Council’s Civil Construction and Maintenance section when installing, replacing or repairing footpaths near trees.

Re-routing or regrading of footpaths around existing trees will be preferred when replacing footpaths. Removal of trees to allow straight footpaths is generally not supported where satisfactory grading and width can be achieved without removing the tree. Cutting or grinding of roots to accommodate footpaths is generally not supported, to be assessed by the Tree Management Officer.

**Reactive Clay Soil**

Tree roots can cause damage to the footings of buildings and fences by expanding and physically disrupting them, and as a consequence of removing water from the soil thereby causing these structures to settle (Fakes 1992, p. 27). The subsoils in the Burwood Local Government Area are classified as ‘moderately reactive’ (Chapman et al. 1989, p.30). Older houses in Burwood typically have a clay subsoil and brick footings. Clay subsoils are the cause of major problems for houses, because they shrink and swell. ‘Reactive’ clays shrink and swell to such an extent that movement can damage houses (Walsh 1988).

To minimise the changes in moisture content of clays, the CSIRO recommends:
- adequate site drainage
- locating gardens and trees away from houses
- adequate but moderate garden watering
- repairing plumbing leaks
- compaction of soils to 95% close to the house will deter roots from growing there

Furthermore, trees and shrubs require water for survival. In late summer or in times of drought, moderate watering of gardens is advisable, to prevent vegetation from drying out the soil and causing it to shrink. Removal of large trees creates the opposite problem. As soil moisture is gradually restored, clays swell and may lift shallow footings.

### Tree Roots and Structures

Many assumptions are made about damage caused by tree roots without proper root mapping and conclusive investigation. Following investigation, if tree roots are found to have caused damage to buildings and fences, there are strategies that can be used to remedy the situation.

Tree removal is a possible course of action, but it is not desirable for two reasons. Firstly, the community has clearly expressed that street trees are important and that more rather than less street trees are required in the Local Government Area. Secondly, tree removal may reverse the water levels in the soil, causing them to expand and lift shallow footings. This is especially apparent if the tree is older than the building (Cameron 1985). Other strategies are to underpin the footing with an engineered concrete pad, or to protect the footing by installing a root control barrier or compacting the soil to 95% near the house.

#### 5.13 ROOT MANAGEMENT

**Root Interactions with Structures or Services**

Council will effectively manage evidence based claims concerning Council owned trees. Adverse interactions may be due to causes other than the street tree, including but not limited to aging infrastructure, lack of maintenance, mechanical damage, soil movement, and private trees.

One of the most important measures that will help mitigate problems caused by roots is appropriate street tree selection. Other strategies include (Harris 1992, p. 504):

- installing root management systems where deemed necessary
- retrospective root pruning and installation of root control barriers, if feasible
- underpinning of foundations
- water tight flexible service lines
- compaction rates of 95% around service easements
- planting street trees as far from below ground services as possible.

Property owners are responsible for the maintenance and repair of structures on their land, including underground services. Sydney Water (2013) states “You are responsible for all pipes that run through your property to the point where they connect to Sydney Water’s wastewater system”, “even if the connection point is outside your property”.

**Root Barriers**

The installation of root control barriers or tree root management systems at the time of planting is considered in high risk zones. Trees typically produce roots in a radial direction. Soil near the surface is usually best suited to root growth, and most tree roots are usually found here. Tree
roots can not grow in compacted soil, such as heavy clay subsoils or heavily trafficked topsoils. Root control barriers aim to direct the growth of tree roots down and away from the surface of the soil, to avoid conflict with trafficable surfaces and other surface elements. For this strategy to be successful, the soil at depth must contain enough oxygen and moisture to sustain the roots.

There are many types of root control barriers available, and a distinction should be made between the root control barrier with vertical ribs and the root control barrier that is flat (Quambusch 1996, p. 19). Studies have shown that the flat root control barrier can create root girdling, and result in tree instability (ibid.).

Root control barriers are best installed at the time of planting. There are two principal applications of root barriers: surround and linear. The surround application is more economical where the distance between the centres of the tree plantings is greater than 7 metres. The linear application of a root barrier is typically used to mitigate potential damage to hardscapes (ibid.). The linear application is also used in root pruning applications, or new tree plantings in nature strips. Linear root barriers are generally restricted for use on not more than 2 sides of a tree.

Root pruning of existing trees and the installation of root control barriers is an appropriate risk management strategy in some circumstances. A clear benefit of this strategy is that the tree, which might otherwise have been removed, can remain.

**Root Investigation**

Root investigation is required, prior to the installation of root control barriers adjacent to existing trees. A suitable method of investigation is root mapping, using a soil vacuum technique or other method. Root mapping can be used to determine the size and direction of root growth, as well as clarifying whether the tree’s roots are the true cause of damage to the target. The root map is analysed by an experienced Arborist, who can determine whether root pruning would be an appropriate and effective course of action, and what distance the roots should be pruned from the trunk of the tree. Root pruning may impair the anchorage of the tree to some extent, and for this reason it will not be suitable in all circumstances. Prior to carrying out root pruning, the Arborist may recommend that crown reduction or thinning be carried out to reduce wind resistance. Due to the cost involved with the installation of root control barriers to existing trees, this risk management strategy is prioritised across the Local Government Area. The feasibility of installing a root barrier will be determined by Council’s Tree Management Officer.

5.14 **HAZARD ASSESSMENTS**

Street trees are typically in the vicinity of pedestrian pathways, streets and private properties. As a result, street trees should be inspected at regular intervals by a person with Arboricultural qualifications. The extent of the inspection will vary depending upon the frequency of pedestrian and vehicle usage near the tree. The inspection procedure should be standardised, systematic and established in writing (Kane et al. 2001).

Each part of the tree should be inspected for risk, including the crown, main stem, branches and roots, and the inspection method should be consistent across the population of street trees in the Local Government Area. A systematic priority rating system should be used to develop a risk management strategy for Council’s street trees. Accordingly, trees that pose the greatest risk would be attended to prior to trees that have lower risks.
Appropriately qualified Council tree management staff are required to carry out the inspections if resources permit, or Council may elect to contract the work to a consulting arborist. The qualifications required to perform assessments of trees are a minimum of AQF Level 4, supervised by a person with AQF Level 5 in Arboriculture. The results of the arboricultural inspections should be collected in Council’s Street Tree Database, and used to generate priority work programs with the objective of risk minimisation.

The use of a Hazard Rating System such as that set out in Matheny & Clarke (1994) should be used when assessing trees. This is a system designed to grade trees for prioritising tree maintenance work in relation to risk management. Alternatively, the Quantified Tree Risk Assessment method may be used, if the assessor is a qualified and licensed user. This method quantifies the degree of risk and probability ratio of likely harm or damage.

5.15 SIGNIFICANT TREES AND HERITAGE CONSERVATION AREAS

The definition of a significant tree varies between local government areas. ‘Significant’ suggests that something is outstanding, or especially meaningful. A tree deemed to be significant has some quality, attribute or characteristic that sets it above or apart from other trees. Generally, significant trees are trees that have been determined to have either environmental or historic values, because they are representative of the indigenous vegetation of the area, or are exotic vegetation associated with European settlement and historic sites. Street trees in Conservation Areas contribute to the “environmental heritage significance” of those areas. In this regard these trees may be considered to be significant trees. The important aesthetic contributions that street trees in conservation areas and other significant trees make are recognised in their management.

Resources are devoted to retaining the existing species in Conservation Areas, where the species is considered to be appropriate in terms of its horticultural characteristics for the site. This could mean that:

- Prioritisation of installation of aerial bundled cabling in Heritage Conservation Areas and other high profile areas where the existing mature trees are adversely interacting with overhead electricity wires so that existing streetscape character and a high level of amenity can be maintained.
- Root control barriers are installed where appropriate
- Street and pavement works are designed to ensure the appropriate allocation of space for tree root development
- Major works to street trees in heritage conservation areas should be referred to Council’s Tree Management Officer and Heritage Advisor for development assessment advice.

5.16 DEVELOPMENT AND STREET TREES

Council street trees must be considered during site analysis as part of any development process, including:

- Development impact on trees;
- Street tree retention values;
- Tree protection measures during development; and
- Bonds or fees payable to Council by the developer for the loss of street trees

Developments should aim to retain street trees which provide amenity value in the streetscape. Council will maintain or improve the Urban Forest within the LGA through retention or replacement.
of street trees. Bonds may be placed on street trees as a condition of consent. If trees are damaged or removed during the development process, the bond will be retained and the damage to the tree ameliorated where possible, or the tree replaced. Where a street tree is permitted to be removed in a Development Consent, a fee is payable to Council according to the Schedule of Fees and Charges, to provide a replacement street tree in a location determined by Council.

5.17 INAPPROPRIATE PLANTING

Trees planted on Council’s nature strips become the property and responsibility of Council. Council will not permit the planting of trees by residents on Council managed land, other than planting undertaken as part of a Development Consent. This is to ensure that:

- appropriate species are selected;
- the location is suitable for planting; and
- damage to underground services is avoided.

5.18 ‘PSEUDO STREET TREES’

A ‘pseudo street tree’ is a tree that grows next to but not in the road reserve or nature strip, but that forms part of the streetscape (Draper 1997, p. 6). Such trees may be in the front garden of a private residence, in a park or school adjacent to the street or along the perimeter boundary of commercial premises. The benefit of pseudo street trees is that they typically have more space to develop, and are less likely to conflict with overhead power lines and trafficable areas. As a result, some of the species of trees that are not suitable for use in the road reserve may be planted, thereby enhancing the impact of the trees in the street. For a planting of pseudo street trees to be successful, information to the community should be made available about suitable planting locations, species selection and maintenance.

Some streets may not offer planting opportunities for pseudo street trees. The planting of soft wooded perennials may apply under these circumstances. This strategy would be limited to Council resources and priorities for planting.

5.19 VANDALISM

Vandalism of street trees in their early stages of growth increases the cost of tree replacement programs. Owing to the number of street trees in Council’s care, prompt replacement of vandalised trees is not always possible. The selection of advanced stock and the use of hardwood tree stakes or tree guards at the time of planting are techniques used to reduce the vandalism of trees. No tree guards will stop vandalism from occurring entirely.

Although smaller stock has a lower replacement cost, the limbs and trunks of small trees are easily damaged by vandals. In most cases, the recommended minimum size of replacement stock is 25 litres, subject to availability and suitability. Larger stock should be used in highly visible areas, such as around shopping centres.

Council has adopted a zero tolerance approach for tree vandalism and will prosecute offenders to the full extent of the law. Significant signage is immediately erected at the site of any vandalised tree to promote Council’s intolerance of tree vandalism. The signage remains in place until the tree is removed and replaced at a time determined by Council’s Tree Management Officer.
5.20 UNAUTHORISED WORKS TO TREES

Vandalism of trees may consist of unauthorised works, such as pruning, lopping, topping, removing, poisoning, ringbarking, injuring or otherwise damaging a street tree. Works to street trees are only permitted to be carried out by Council or someone contracted or authorised by Council to do the work. This is to ensure that all pruning outcomes comply with the Australian Standard AS4373 – Pruning of Amenity Trees, and to avoid damage to Council’s tree assets.

Also refer to section 5.17 regarding planting of street trees by residents.

5.21 REVIEW PROCESS

Internal Review Process

If a request for a street tree to be removed or pruned is refused, the resident may seek a review by an internal panel comprised of the General Manager, Deputy General Manager (Land Environment & Infrastructure) or their delegate and an external Arborist on Council’s panel. The internal panel will make their decision in accordance with the provisions of this strategy (Street Tree Management Strategy) and an applicable fee under the Council’s fees and charges will be paid.

Appeal Process for Development Applications

Where street tree works are determined by way of a Development Application, the same legal right of appeal applies as for Development Applications in the Land and Environment Court pursuant to Section 97 of the Environmental Planning & Assessment Act 1979.

6 RELATED DOCUMENTS

In addition to this Strategy, the management of Burwood Council’s street tree population must be carried out in accordance with the following related documents:

- Burwood Local Environmental Plan (2012)
- Burwood Development Control Plan (2013)
- Landscaping Code, Burwood Council (2010)
- Code of Practice for the Amenity Tree Industry, WorkCover NSW (1998)
- Urban Tree Risk Management Guide, Westpool (no date)

7 REFERENCES


Chapman, G & Murphy, C 1989, Soil Landscapes of the Sydney 1:100 000 Sheet, Soil Conservation Service of NSW, Sydney.


