



Marrickville


**Street Tree
Master Plan
2014**

**Adopted
September 2014**

MARRICKVILLE
council

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"Someone is sitting in the shade today because someone planted a tree a long time ago."

Anonymous

The Vision

Street trees are one of Marrickville's most important natural assets. The Street Tree Master Plan 2014 recognises the collective ecological, environmental, economic, cultural and social contributions of Marrickville's street trees. The principle of the Street Tree Master Plan is to *"increase the urban tree canopy through sustainable new and replacement tree plantings and maintain street trees throughout the local area"* as outlined in Marrickville Council's Community Strategic Plan.

This Master Plan is a guide to aid in the maintenance and future provision of street trees across the entire municipality. The objective of this Master Plan is to provide a sustainable and strategic framework that is used for the management of Marrickville's street tree canopy. The Plan will also contribute to the collective urban forest, for the benefit of all, through good street tree planning, maintenance, enhancement and reinforcing Marrickville's ongoing commitment to the protection of trees.

With implementation of this Master Plan, Marrickville will continue to provide a population of healthy street trees which will beautify and define our urban environment today and become an important legacy for future generations.

1.0 Introduction

1.1 How to Use This Plan

This document is one part of Marrickville's suite of documents used to proactively manage its tree resources. Trees, like all living things, grow, age and eventually die. It is therefore important that we have a strategy and a plan to deal with our street trees. The Plan will outline where trees are to be planted and what species are to be used to replace trees when they eventually reach the end of their useful life. In short, this document is intended to guide the future of all street tree planting throughout Marrickville. The progress of the Plan will be reviewed annually with a comprehensive review at no longer than 10 years from its adoption.

The general rule the Council has followed in developing this plan is to continue the existing street characters and tree planting as much as possible, unless there are specific problems to address or clear opportunities for improvement and increased canopy cover. Council will seldom remove a healthy street tree. If a certain type of tree is proposed for a street, it does not mean that Council will remove the existing street trees in the short term to implement the proposed new species. This will typically only happen over time, as trees need replacing or if an opportunity exists to plant a new tree in an otherwise vacant area.

Existing street trees will normally be left to grow for their natural life and will only be removed once they become an unacceptable hazard or are clearly failing to provide worthwhile streetscape amenity. The exception to this may be when major street improvements or upgrade works are required or it is planned to revitalise a specific area, but even then tree removal will normally be avoided where possible.

As a member of the community, the way you might use this plan is outlined below.

1. Read Part 2 & 3 on tree species selection to understand the many complex considerations involved in selecting any street tree and its placement.
2. Refer to Part 5 that has a map of the entire Marrickville Local Government Area (LGA) area and identify the precinct that your street lies within.
3. Once you have located the precinct in which your street lies, you should then refer to that precinct's summary page and the proposed Tree Species listings for each street. The list shows what species of trees are proposed for each street within the precinct.
4. If you are unfamiliar with the tree species, you may want to refer to Part 6 at the end of the document where a brief Tree Data Sheet is provided for all the tree species proposed, giving a photograph, a brief description of the trees and outlining their key features.

We hope you find this document useful and share our passion in making Marrickville a green, sustainable and beautiful area.



Figure 1.1- Canonbury Grove, Dulwich Hill - The great streets of the future are dependent on how we plan and implement our street planting today. (Photo Arterra)

1.2 Context & History

Background

Located in the inner-western suburbs of Sydney, Marrickville LGA is about 4-10 kilometres southwest of the city centre. Population as at 2011 was 81,489. It covers an area of approximately 17 square kilometres.

The area is bounded by Parramatta Road to the north, King Street and the Princes Highway to the east, the Cooks River and Alexandra Canal to the south, and New and Old Canterbury Roads to the west. Kingsford Smith International Airport is situated to the southeast of the LGA. Consequently, parts of the LGA (particularly Sydenham, St Peters and Tempe) experience high levels of aircraft noise.

Marrickville LGA is well served by transport including road, rail and active transport. Arterial road routes running either along the LGA's boundaries or through it include Parramatta Road, State Route 54 (along New Canterbury Road, Stanmore and Enmore Road), linking Sydney CBD to Liverpool, and also the King Street-Princes Highway corridor.

Historical Context

At first settlement, Marrickville consisted of natural forest associations of the Cumberland Plain and the Cooks River Valley. By 1830, small areas had been cleared and cultivated. Between 1830 and 1860 small villages and villa estates developed. By the 1880's suburbs had developed in association with improved transportation (both road and rail). These subdivisions changed the character of Marrickville from villages surrounded by semi rural areas to a large continuous urban area.

The majority of development throughout Marrickville occurred in the late 1800's and early 1900's. Most areas were fully developed in line with the current fabric by the 1920's.

Street planting was typically uncommon in most inner Sydney city suburbs prior to the 1940's and 50's. Several streets within the Marrickville LGA did have prominent planting that occurred in the late 1920's and 1930's, often as part of employment programs associated with "the Depression" era.

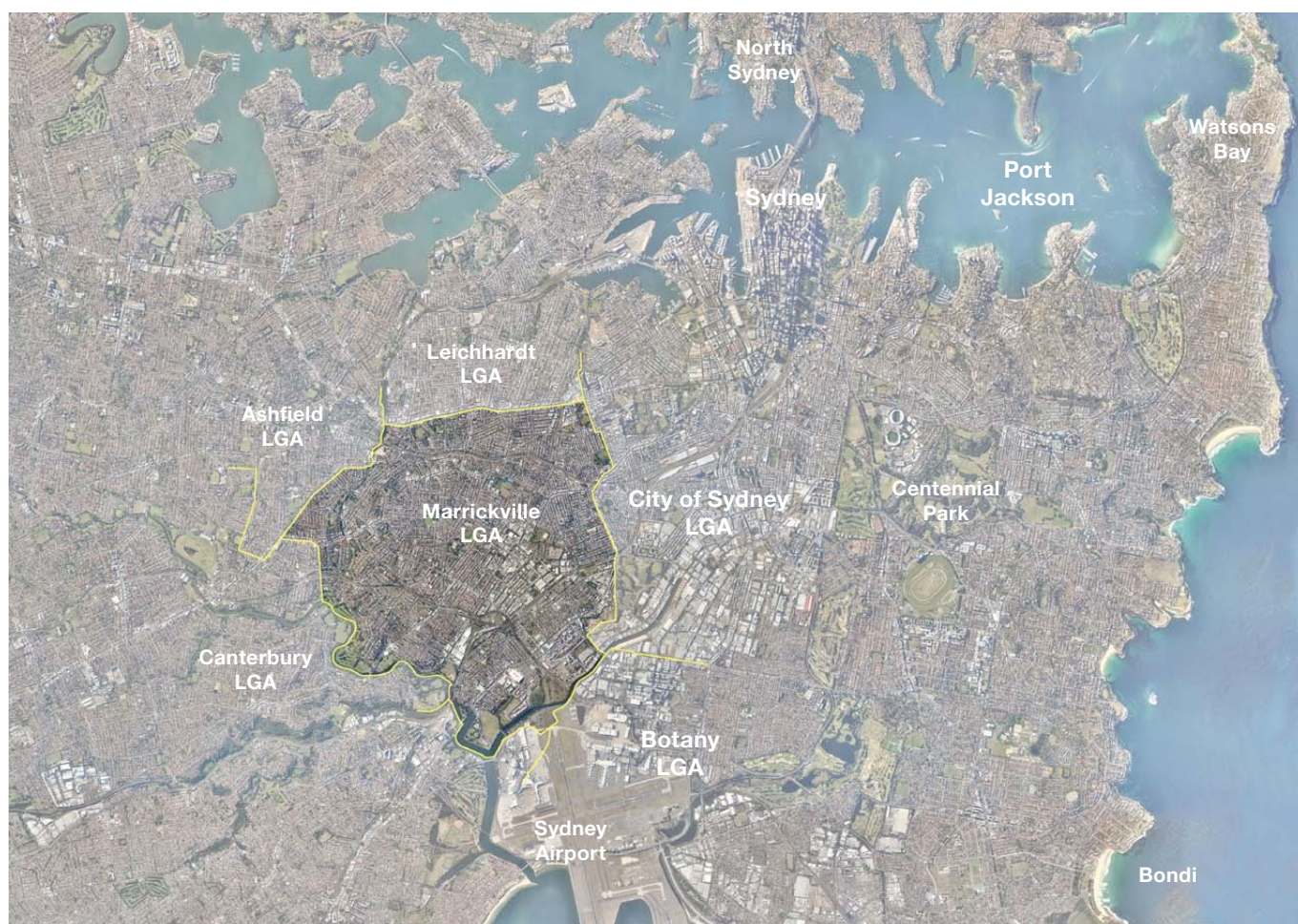


Figure 1.2 Marrickville - Local Government Area and Context Plan (Source: NearMap August 2013)



Figure 1.3- Canonbury Grove, Dulwich Hill - one of the numerous historic streets in the LGA with a distinctive in-road planting treatment dating back to the 1930's. (Photo Arterra)



Figure 1.4- View over Marrickville in 1943, with the tree planting in streets like Canonbury Grove, Woodcourt Street, Robert Street and David Street clearly visible. Most other streets had very little if any street tree planting until much later. (Source: NSW Lands Dept Six Viewer)



Figure 1.5- Graham Avenue, Marrickville (Photo Arterra)

Streets with notable historic planting that still remain are summarised in the table below:-

Street	Precinct	Existing Primary Tree Species	Comments
Canonbury Grove, Dulwich Hill	1. Dulwich Hill East	<i>Lophostemon confertus</i> (Brush Box)	
Durham Street, Dulwich Hill	1. Dulwich Hill East	<i>Lophostemon confertus</i> (Brush Box)	
Ness Avenue, Dulwich Hill	1. Dulwich Hill East	<i>Lophostemon confertus</i> (Brush Box)	
The Boulevarde, Dulwich Hill	3. Lewisham & Petersham North	<i>Lophostemon confertus</i> (Brush Box)	not in-road
David Street, Marrickville	4. Marrickville Central	<i>Cinnamomum camphora</i> (Camphor Laurel)	
Harney Street, Marrickville	4. Marrickville Central	<i>Lophostemon confertus</i> (Brush Box)	
Marrickville Avenue, Marrickville	4. Marrickville Central	<i>Lophostemon confertus</i> (Brush Box)	
Northcote Street, Marrickville	4. Marrickville Central	<i>Podocarpus elatus</i> (Plum Pine)	
Robert Street, Marrickville	4. Marrickville Central	<i>Lophostemon confertus</i> (Brush Box)	
Woodcourt Street, Marrickville	4. Marrickville Central	<i>Lophostemon confertus</i> (Brush Box)	
Graham Avenue, Marrickville	5. Marrickville Central	<i>Phoenix canariensis</i> (Canary Island Date Palm)	
Frampton Ave, Marrickville	5. Marrickville Industrial	<i>Lophostemon confertus</i> (Brush Box)	
Juliett Street, Marrickville	5. Marrickville Industrial	<i>Lophostemon confertus</i> (Brush Box)	
Victoria Rd (east of Juliett St)	5. Marrickville Industrial	<i>Lophostemon confertus</i> (Brush Box)	
Carrington Road	6. Marrickville South	<i>Phoenix canariensis</i> (Canary Island Date Palm)	
Ewart Street, Marrickville	6. Marrickville South	<i>Podocarpus elatus</i> (Plum Pine)	not in-road
Excelsior Parade, Marrickville	6. Marrickville South	<i>Lophostemon confertus</i> (Brush Box)	
Harnett Avenue, Marrickville	6. Marrickville South	<i>Lophostemon confertus</i> (Brush Box)	
High Street, Marrickville	6. Marrickville South	<i>Butia capitata</i> (Jelly Palm)	
Kays Avenue East, Marrickville	6. Marrickville South	<i>Podocarpus elatus</i> (Plum Pine)	
Osgood Avenue, Marrickville	6. Marrickville South	<i>Lophostemon confertus</i> (Brush Box)	
Warburton Street, Marrickville	6. Marrickville South	<i>Ficus microcarpa</i> var. <i>hillii</i> (Hills Weeping Fig)	
Marmion Street, Camperdown	7. Newtown North & Camperdown	<i>Lophostemon confertus</i> (Brush Box)	deteriorated
Juliett Street, Marrickville	8. Newtown South & Enmore	<i>Lophostemon confertus</i> (Brush Box)	deteriorated
Metropolitan Road, Newtown	8. Newtown South & Enmore	<i>Cinnamomum camphora</i> (Camphor Laurel)	
Pemell Street, Newtown	8. Newtown South & Enmore	<i>Cinnamomum camphora</i> (Camphor Laurel)	
John Street, Tempe	12. Tempe	<i>Lophostemon confertus</i> (Brush Box)	deteriorated
William Street, Tempe	12. Tempe	<i>Lophostemon confertus</i> (Brush Box)	deteriorated

Geology and Soils

The majority of the Marrickville LGA is physically characterised as a residual soil landscape comprising gently undulating rises on Wianamatta Group Shales. The result is shale-derived clay or clay loam soils which dominate this area and generally provide favourable conditions for street tree planting.

Smaller pockets of Hawkesbury Sandstone are located in the southern parts of Marrickville and Dulwich Hill.

Parts of Marrickville, Sydenham, Tempe and St Peters are on alluvial floodplain areas, which are dominated by silty clay loams usually derived from deposition of upstream clay soils.

More highly disturbed soils and landfill areas are located along the Cooks River in Tempe, St Peters, Sydenham and Marrickville. Generally these are areas that were previously swamps, estuaries and wetlands and have been subject to historical landfilling and the current soil origin and quality is often unknown.



Figure 1.6- Although the majority of soils with the LGA are shale derived clay soils, there are some pockets of sandstone that can lead to very restrictive soil conditions for tree planting. (Photo Arterra)

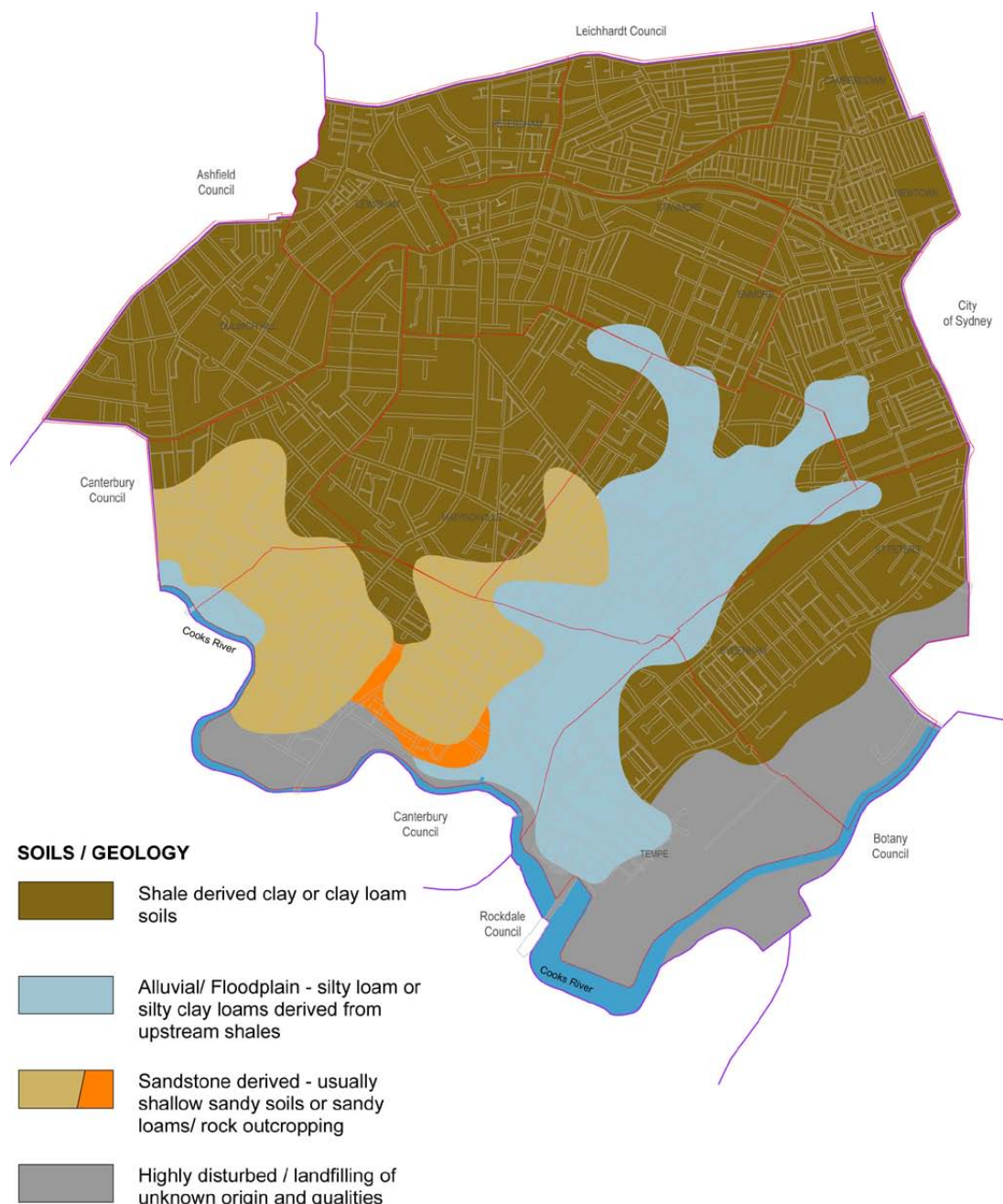


Figure 1.7 - Soil types within the Marrickville LGA (Source: Chapman)

Topography

The overall topography of the area consists of gently undulating slopes, with some steeper sections to the southern side of Marrickville where the land slopes steeply down to the Cooks River. The higher areas of Marrickville South is characterized by rocky sandstone outcrops and is typically drier and exposed to climatic elements such as strong prevailing winds.

Areas adjacent to the Cooks River, around Tempe and Sydenham, that were once tidal mudflats and saltmarsh, have often been filled and are relatively flat.

Generally, the selection of street trees across the municipality is not greatly dictated by the topography of the area, other than the higher sandstone ridges, where trees species will need to be tolerant of more exposed conditions and poorer soils.

Climate

The Marrickville LGA experiences moderate temperatures, good rainfall and minimal climatic and weather extremes. It is typically described as a 'temperate' climate with hot to warm summers and cold winters, with relatively uniform rainfalls. There is no distinctly dry season.

The average annual rainfall is 1083mm, and is fairly evenly spread across the year but with a slightly drier period from July - October. The highest rainfall usually occurs in June with an average of 120mm and the driest month is September with an average of 60mm (figures are according to the Sydney Airport AMO weather recording station).

Maximum average daily temperatures, recorded range from 26.5°C in January to 17°C in July. The minimum average daily temperatures range from a low of 19°C in February down to lows of 7.2°C in July. Frosts are extremely rare.

The primary wind direction is from the northeast to southeast in the afternoons while it is predominantly from the west and northwest in the mornings. This is common of coastal areas dominated by 'sea breeze' affects. The strongest winds (>30km/h) are normally experienced from the southeast and southerly directions and later in the day. (Source: Australian Bureau of Meteorology).

In comparison with other areas of the greater western Sydney region that experience much higher maximum and lower minimum temperatures and substantially lower annual rainfall, the Marrickville area enjoys a very comfortable climate which in turn lends itself to a very diverse range of tree species that will happily grow in the area. There are no noticeable microclimatic influences in the area.



Figure 1.8- The Cooks River from Tempe, a major natural feature defining the southern portions of the LGA (Photo Arterra)

1.3 The Strategic Framework & Council Policies

In August 2011, Council adopted the Marrickville Urban Forest Strategy (MUFS), a policy that established Council's commitment to the holistic management of Marrickville's urban forest. This document reflects Council's philosophy to increase the urban tree canopy that is outlined in the broader policy known as the Marrickville Community Strategic Plan. The preparation of a Street Tree Master Plan (STMP) was identified as a priority action in the MUFS, and as shown on the adjacent Strategic Framework diagram.

In the preparation of the Street Tree Master Plan the following Marrickville Council policies and documents with relevance to street trees and the Urban Forest have been reviewed and considered;

- Street Tree Inventory Database & Report, 11 October 2012
- Marrickville Local Environmental Plan 2011 - Heritage Map
- Marrickville Urban Forest Strategy 2011
- Marrickville Recreation Policy and Strategy 2013
- Biodiversity Strategy & Appendices 2011-2021
- Recreation Needs Research: Strategic Directions for Marrickville 2011
- Draft Strategy for a Water Sensitive Community 2012-2021
- Council Meeting: Asset Management Strategy and Policy, 16 February 2010
- Council Meeting: Tree Management - Inventory, Master Plan and Policy Framework, 20 November 2012
- Development Control Plan - 2.18 Generic Provisions Landscaping and Open Spaces & 2.20 Tree Management 2010
- Marrickville Public Domain Concept Designs
- Native Plants of the Cooks River
- Marrickville Council WSUD Reference Guideline, February 2012
- Improving the Road Reserve March 2011
- Census Briefing 2012
- Planting your Nature Strip Guidelines
- Verge Planting October 2011
- Tree Assessment & Report - Day Street, Marrickville (2005)
- Riverside Crescent Subcatchment Management Plan October 2010
- Eastern Channel East Subcatchment Management Plan 2011
- Tennyson Street Subcatchment Management Plan 2009
- Urban Risk Tree Management Guide prepared by Westpool, Penrith
- Impacts of Climate Change on Aeroallergens and Allergic Diseases - Report to Marrickville Council September 2013

The STMP aims to complement and achieve the objectives defined in many of Council’s policy documents by:-

- The identification of many new planting opportunities within the LGA, particularly the expansion of in-road planting/ kerb extensions, or planting in currently under treed industrial areas;
- A larger inclusion in the STMP of medium sized tree species (and large trees wherever technically possible), to improve the overall LGA canopy cover. In many cases existing small trees have been suggested to be replaced, over time, with slightly larger ‘medium-sized’ trees.
- The introduction of more locally indigenous and native tree species to provide for increased ecological benefits and biodiversity.
- Identification of several sites where WSUD initiatives could be increased and implemented.
- Selection of the best species to maximise the benefits of shading and solar access using the paradigm of ‘right tree for the right place’.
- Provision of a variety of improved planting details for various situations providing details on improved tree planting, its position in relation to the road and better soil conditions to ensure the health and longevity of each tree is optimised.



Figure 1.9- The Boulevard, Dulwich Hill (Photo Arterra)

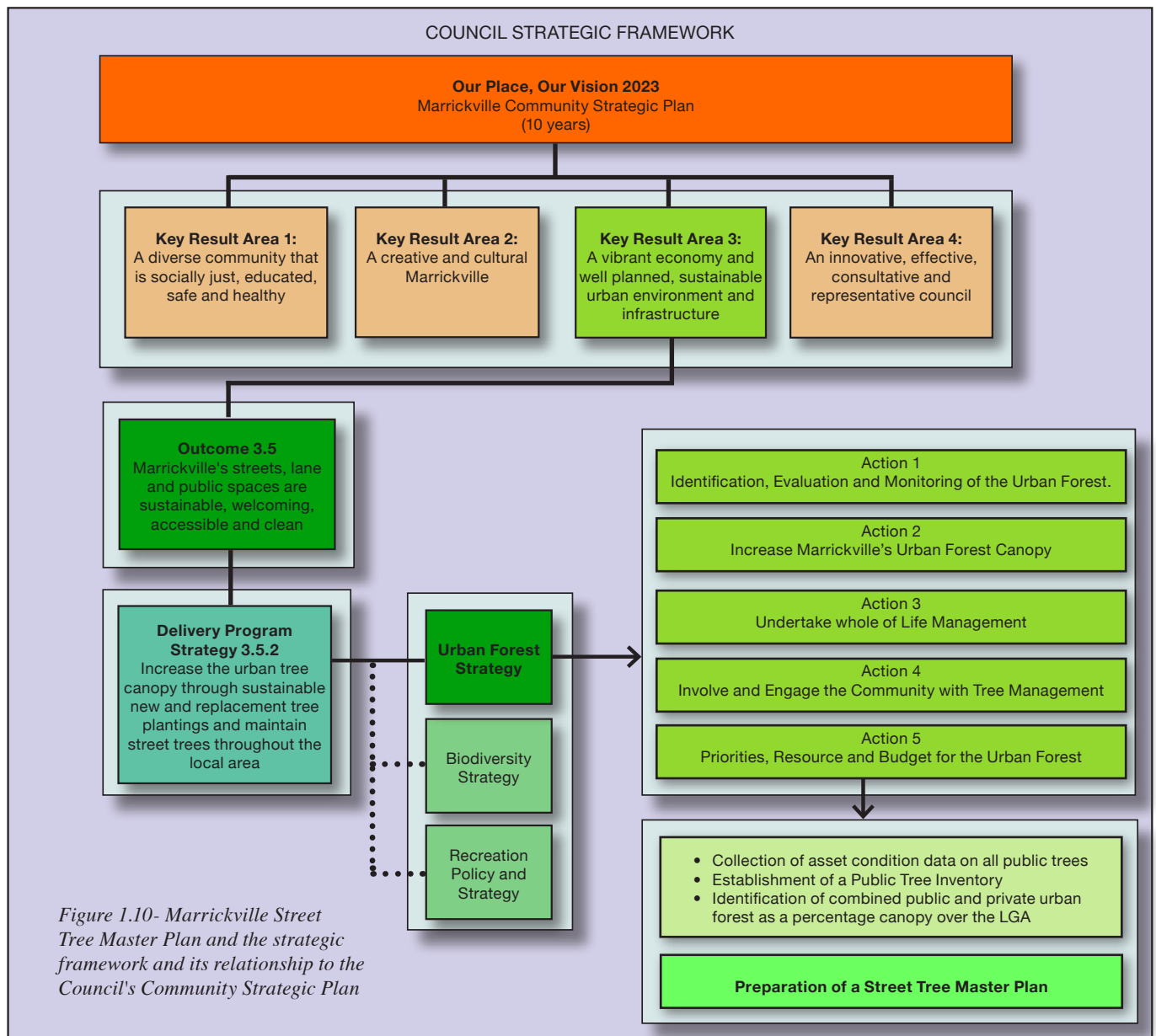


Figure 1.10- Marrickville Street Tree Master Plan and the strategic framework and its relationship to the Council's Community Strategic Plan

1.4 Street Tree Master Plan Objectives

The Street Tree Master Plan is a plan for the effective short and long term management of the Council owned and managed street trees. This document establishes a clear direction for the future development, planting and management of street trees within the Marrickville LGA.

The principle aim of the Street Tree Master Plan is to "increase the urban tree canopy through sustainable new and replacement tree plantings and maintain street trees throughout the local area" (in accordance with the Community Strategic Plan 3.5.2).

The key objectives of the Street Tree Master Plan are to:

- Promote and capitalise on the benefits of Marrickville's existing urban forest whilst minimising the ongoing costs of street tree and infrastructure maintenance;
- Provide direction on the most appropriate species and planting techniques;
- Establish an appropriate street tree species palette that is suited to the environmental conditions of Marrickville's public domain;
- Improve street tree establishment, habits and survival rates;
- Guide the maintenance and management of existing and new trees to ensure that they survive and flourish in otherwise harsh and unnatural urban conditions;
- Support and enhance the biodiversity values in the local area;
- Improve the Council's wider community's knowledge and understanding of good urban tree and forest management;
- Guide Council's decision making and provide a transparent and accountable processes for planting, maintenance, customer requests and development application assessments and
- Assist Council staff in the planning, budgeting, implementation, and maintenance of street tree planting by providing consistent guidance on suitable species, locations and planting patterns.

1.5 Community Engagement

In preparation for drafting the STMP, a range of community engagement activities amongst Marrickville LGA residents have been undertaken to identify the views and attitudes within the community on street tree matters. Council's recent customer complaints records from the previous 12-18 months regarding street trees were analysed. Community engagement activities included a random telephone survey of residents, a web-based online survey, a mail-out to people that indicated a desire for more information during the above surveys, presentations to elected Councillor's and nominated committees, and the public exhibition of the draft STMP for feedback and comment prior to its final adoption.

Generally the results and analysis of the surveys and presentations to other stakeholders showed that Marrickville residents are very positive towards street trees and see street trees as a way to beautify the local area, even if they have experienced issues with street trees in the past. The two main drawbacks that residents focused on regarding street tree planting were damage to adjoining public infrastructure (such as footpaths and plumbing) and leaf drop on cars, houses and footpaths. Whilst a very small minority of residents showed negative feelings and views of street trees, overwhelmingly there was a clear preference towards street trees from the community as a whole.

In summary, the telephone and online survey results showed a clear preference for street trees with the following attributes:-

- Street trees that are native to Australia or locally native to Marrickville
- A mix of different species of tree with two or more species within the same street
- Evergreen trees, that is trees that don't lose their leaves during winter.
- Use of medium sized trees (attaining 10-15m in height at maturity).
- Broad and spreading trees with relative thin and less dense foliage that provides filtered shade.

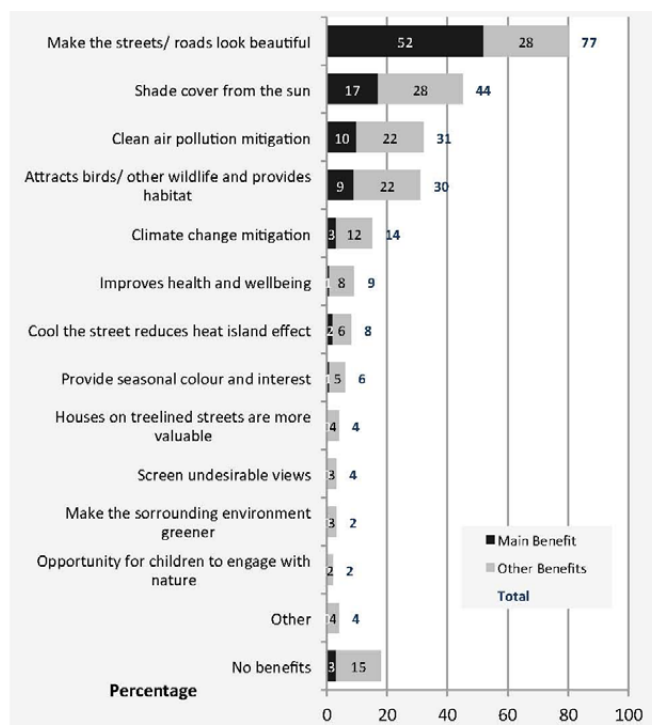


Figure 1.11 - 77% of residents believe that street trees make the streets look beautiful.



Figure 1.12- Biodiversity Priority Planting Areas - As part of the STMP and the analysis of various other Council policies regarding biodiversity initiatives, the above Biodiversity Priority Planting Areas have been identified. These areas generally include the existing habitat corridors and green web areas within the LGA, particularly along the Cooks River, Alexandra Canal through to Sydney Park and along the major railway corridors. In these areas preference will be given to the planting of a range of locally indigenous street trees, where it is feasible.

1.6 Benefits of Street Trees

Street trees are a vital urban and suburban element that can transform the character of streets and provide numerous environmental, aesthetic, cultural and economic benefits. In the long term, they often create a very real 'sense of place' and dramatically enhance the public domain. The benefits of street tree planting can be viewed in the following categories:

Environmental Benefits

- Carbon sequestration and storage. A single mature tree can absorb carbon dioxide at a rate of 21 kg/year and release enough oxygen back into the atmosphere to support 2 people's needs.
- Shading of pavement, cars and buildings, thereby reducing urban temperatures. Shading of asphalt pavements can also extend its life.
- Removal of gaseous pollutants by absorbing them with normal air components through the stomates in the leaf surface. (eg. Sulfur Dioxide, Ozone, Nitrogen Oxide), plus capture and removal of particles such as dust from the air.
- Acting as natural pollution filters. Their canopies, trunks, roots, and associated soil, filter polluting particulate matter out of stormwater flows and also slow and reduce the flow of runoff, reducing the amount of pollution that is washed into drains and catchment areas. Trees also take up and utilise nutrients like nitrogen, phosphorus, and potassium that can otherwise pollute streams.
- Intercepting and reducing raindrop impact and runoff and thereby reduce erosion of exposed soils and siltation of creeks and drains.
- Providing habitat, roosting and food sources for urban fauna.

Economic Benefits

- Improving economic performance by increasing the attractiveness of businesses and tourism areas. It has been shown that people typically linger, shop and dine longer in tree-lined streets.
- Reducing energy consumption, through shading and reductions in the "urban heat island" effects.
- Shops, apartments and housing in well planted areas usually attract higher rents and sale prices.

Social and Psychological Benefits

- Calming traffic, slowing speeds, and providing a buffer between pedestrians and cars. They are also useful in delineating and signifying curves in a street.
- Improved sociological benefits with studies showing strong correlation of well planted areas with reduced social services, domestic violence, and strengthened community ties.
- Creation of feelings of relaxation and well-being. Hospital patients, for example, are shown to recover quicker and with fewer complications when in rooms with views of trees. Workers and students are also shown to be more productive when their environments have views to trees.
- Improving comfort and general amenity as street tree canopies can shade pedestrians, diminish traffic noise, screen unwanted views and reduce glare.
- Defining precincts and links with history. Tree lined streets can provide orientation, and contribute to the overall urban character.
- Providing a human scale that contrasts with apartments and larger buildings that can otherwise dominate some streets.
- Providing seasonal interest and natural beauty through foliage and their interesting leaf patterns, flowers, bark, fruit and canopy.



Figure 1.13 - A row of *Eucalyptus paniculata* along Browns Avenue, Enmore. This is a good example of using medium sized and native trees (where space permits) that contribute to the character of the area and the overall urban canopy cover.

1.7 Street Trees and the Urban Environment

Although trees present a myriad of benefits we have to recognise that they may also present problems, costs and risks, particularly if poorly planned, planted or managed. A tree is a dynamic living organism and can be a potentially large 'structure'. Every species is genetically determined to achieve certain proportions, within the limits imposed by its immediate environment. A tree's mature size has to be accounted for when planning any new planting or when designing new structures that are close to existing trees.

Despite the best intentions, trees can present a variety of forms and habits even within the one species type and within the one street. Street trees are most often planted within an artificial and constructed environment that is far removed from its natural habitat, which in turn lead to some negative aspects associated with trees in the urban environment. However, it is generally considered that the benefits trees contribute to our wider environment usually far outweigh many of the negative aspects.

Marrickville has a wide and varied population of residents, living in apartments, terrace houses, small and large lot suburban housing. Each resident will have a different perspective and interaction with street trees and the wider urban forest. The community as a whole also includes business owners and employees who may visit and engage with the area and its trees every day. As such, Marrickville encompasses many people with an extremely diverse range of interests and attitudes towards street trees.

The most common causes of problems and concerns with trees, including street trees are:-

- cracking and lifting of pavement and walls;
- clogging of pipes and services;
- obstruction of views;
- obstruction of pedestrian and vehicle access and street signage;
- dropping of leaves and fruit;
- attraction of animals and birds that may cause mess and irritation;
- shedding of larger branches;
- excessive shading or blocking of sunlight;
- obscuring of street lighting.

Often many of the common issues associated with street trees can be adequately addressed without tree removal. Appropriate maintenance and pruning can often alleviate most concerns, and appropriate repair or redesign of infrastructure can also be undertaken with little impact to the tree and the tree can continue its valuable contribution for many decades.

It is also important that people recognise, and are informed about, the need for change. As trees age they will typically require maintenance and then eventually will require removal and replacement. In a natural ecosystem this happens gradually and with little problem or impact to people. In an urban environment an aging or hazardous tree cannot be left until it completely fails, as is the case in natural areas.

Tree removal can be traumatic and emotional. Often trees have been there for many decades - people have grown up with them and become attached to their presence, their size and their aesthetic appeal. The trees may also represent associations to past events and historical places. For these and many other reasons, some parts of the community often have expectations of trees being retained for very long periods. There will come a time, however, when the benefit of keeping an individual tree is far outweighed by the risk to life or property and the monetary cost of maintaining it. In summary, when managing and establishing any urban forest the needs of the 'many' may often have to override the desires of the 'few'.

Street trees can evoke a negative perception within the community. Based on feedback from the resident survey, the two main concerns raised are damage to public infrastructure such as footpaths and plumbing (29%) and leaf drop on cars, houses and footpaths (24%). Each of these are discussed in more detail in the sections below.

Damage to pavements and structures

Many old established trees (often the vigorous and larger growing species) in our area can and have caused footpath uplift and cracking. In adhering to the principle of the 'right tree for the right location' future pavement damage can be significantly minimised.

An important factor is site preparation, planting and the establishment techniques used for new tree planting. To minimise pavement damage, the use of expanded planting pits, and in-road blisters or kerb extensions (where possible) will be considered. Also maximising the size of the planting 'cut outs' in the pavements and the use of flexible pavements and other devices such as "Tripstop™" jointing system will assist in minimising future issues.



Figure 1.14 -Infrastructure damage is one of the most common impacts of street tree planting (Photo Arterra)



Figure 1.15 - An example of excessive overshadowing on the south side of a street with small building setbacks and impact with overhead wires (Photo Arterra)

Other factors that commonly contribute to negative interactions between trees and structures include:

- The prevailing soil type, structure and depth;
- The tree species and its genetic dispositions that influences its ultimate size and shape;
- The design of the nearby structures;
- The construction materials, quality of installation and methods adopted;
- The age of the adjoining structure (as with trees, most structures have a 'useful life span' and have to be maintained and then replaced within set time frames); and
- The type of previous land use (eg. industrial sites where soil contamination and/or layers of fill can impede normal biological processes).

Whilst roots are opportunistic they do not act 'aggressively' as often believed. Root growth occurs via extension at the very end of the root tip and it can only occur when there is sufficient soil oxygen and moisture. They will not grow if there is too much water, not enough oxygen, or if the spaces in the soil are too small or compacted. Knowledge of root growth characteristics can be used in the design of infrastructure in proximity to trees. Equally important is the provision of sufficient space for the growth of healthy trees. If sufficient space is not provided at time of planting roots will typically occupy the spaces directly under the pavements, increasing the risk of pavement lifting.

Tree roots are also storage organs and they do have the potential to generate new roots after being cut. In most cases, a tree will generate new roots when roots are cut cleanly, but if roots are torn or crushed then they are most likely to decay and die leading to a potential loss of tree stability and ingress of unwanted pathogens.

The table below outlines some of the common hazards and issues raised regarding street trees and outlines how Council will approach resolution of these issues.

Hazard Abatement Strategy	Description
Monitor trip points	Where no other practical method can be employed to prevent this occurring, a regular trip point inspection program should be instigated and pavement replaced or repaired as necessary.
Flexible pathways	Use of flexible material such as bitumen, paving, or rubber compounds for footpaths and tree surrounds, will reduce the occurrence of trip points and is less expensive and easier than concrete to maintain or replace when necessary.
Re-direct pathways	Where space allows, pathways should be re-directed away from trees/tree roots. It may also be beneficial to reduce the newly directed pathway width.
Bridging Footpaths	Self-supporting construction methods, such as pier and beam could be used to raise pathways above the roots, allowing for root expansion without damaging the pavement. Timber bridges are an effective option.
Root pruning	Non-structural roots could be pruned on a predetermined basis under the guidance of a qualified arborist. This practice could be combined with installation of root barriers where appropriate.
Root barriers	Where future problems can reasonably foreseen or damage by tree roots can be proven, barriers in specific cases may be installed to deflect roots away from structures or services. These are typically very site-specific and are not encouraged except as a last resort.
Tunnelling for services	Tunnelling (directional boring) rather than open trenching for underground service installation, will greatly reduce public risk as well as reducing injury to tree roots. If located deeply, root contact with the pipelines may be minimised as the majority of roots of most species will remain within the top 1 metre of soil (based on a soil with medium texture).
PVC welded piping	Replacement of old earthenware pipes with PVC or polyurethane will significantly reduce the potential for tree root entry.
Preventative tree maintenance	Trees in public areas should be regularly inspected and maintenance activities, such as dead-wooding and formative pruning carried out as prescribed. Pruning should always be undertaken in accordance with AS 4373-2007.
Raising pathways	Where appropriate, pathways could be raised to reduce direct root pressure on the pavement. Care must be taken not to build up soil against the trunk of a tree. Aeration piping, in conjunction with geotextile fabric and gravel should be installed between root zone and new pavement to aid with gas exchange to roots. Care should be taken to shape the new surface to drain water away from the trunk of the tree.
Insulated (ABC) cabling	Replacement of uninsulated overhead powerlines with insulated and bundled cables will reduce both the clearances needed and the pruning costs and severity.
Undergrounding of power and communications cables	The initially high cost of installing power underground may in fact be a practical option when compared with the projected cost of repeated pruning, the risk that this work involves to operators, the negative impact on tree health, loss of public amenity and of urban forest economic contributions.

Leaf and fruit droppings

All trees, including evergreen species, drop leaves. Likewise nearly all trees will at some time during the year drop fruit, flowers and bark. Strategies that can be employed to reduce the impact of leaf and fruit litter in our streets will be the coordination of our street sweeping resources to target problem areas and seasons.

Species that are known to develop excessive fruit production or very fleshy fruits or leaves that become slippery on decomposition will typically be avoided for selection, particularly in paved or heavily trafficked areas.

Allergies

Concern is sometimes raised that particular tree species cause allergies/ irritation and respiratory problems. It is important to note there is a difference between an allergic reaction and an irritation. All flowering plants including grasses produce pollen. Generally species that rely on wind pollination create a greater pollen load to ensure continuation of the species. Pollen in the air can contribute to hayfever, eye allergies and other respiratory problems.

Grass species are by far the most prevalent pollen producers and have a long pollen season. Grasses rely on wind to disperse their microscopic pollens, which are produced in vast quantities. In Sydney the grass pollen season goes from September into January or February depending on prevailing weather. Eye allergy symptoms may be reduced by sufferers wearing wrap around sunglasses and a hat. This has the potential to exclude the majority of pollen grains affecting the eyes.



Figure 1.16 - Some species such as this Plum Pine can produce excessive fruit drop and should be avoided except in special circumstances.



Figure 1.17 - Although Plane Trees are a useful and robust street tree, the potential nuisance, discomfort and irritation from the fruit and leaves needs to be carefully managed and assessed prior to their more widespread use.

Property Clearances, Views and Solar Access

Pruning

The Council will prune trees to maintain a reasonable and safe clearance between trees and pedestrians, vehicles and private property. Council has developed specific guidelines with regard to tree pruning for clearances and to maintain views and solar access. Refer to Figure 1.18 below for a diagram that graphically illustrates the proposed clearances and offsets for tree pruning. This is a guideline illustration only and actual clearances required will depend on site constraints.

Council will not typically prune a tree for the provision of views or creation of unreasonable solar access. Council will avoid pruning practices which disfigure the tree or are detrimental to its healthy and safe condition.

When planting new street trees Council will consider the impact the mature tree may have on surrounding residents views and will, as far as practicable and reasonable, avoid planting overly large trees that will block previously unencumbered views.

If an existing tree is removed, any replacement tree will normally be similar in scale and form and will be planted in close proximity to the original tree. It will be allowed to reach its natural potential.

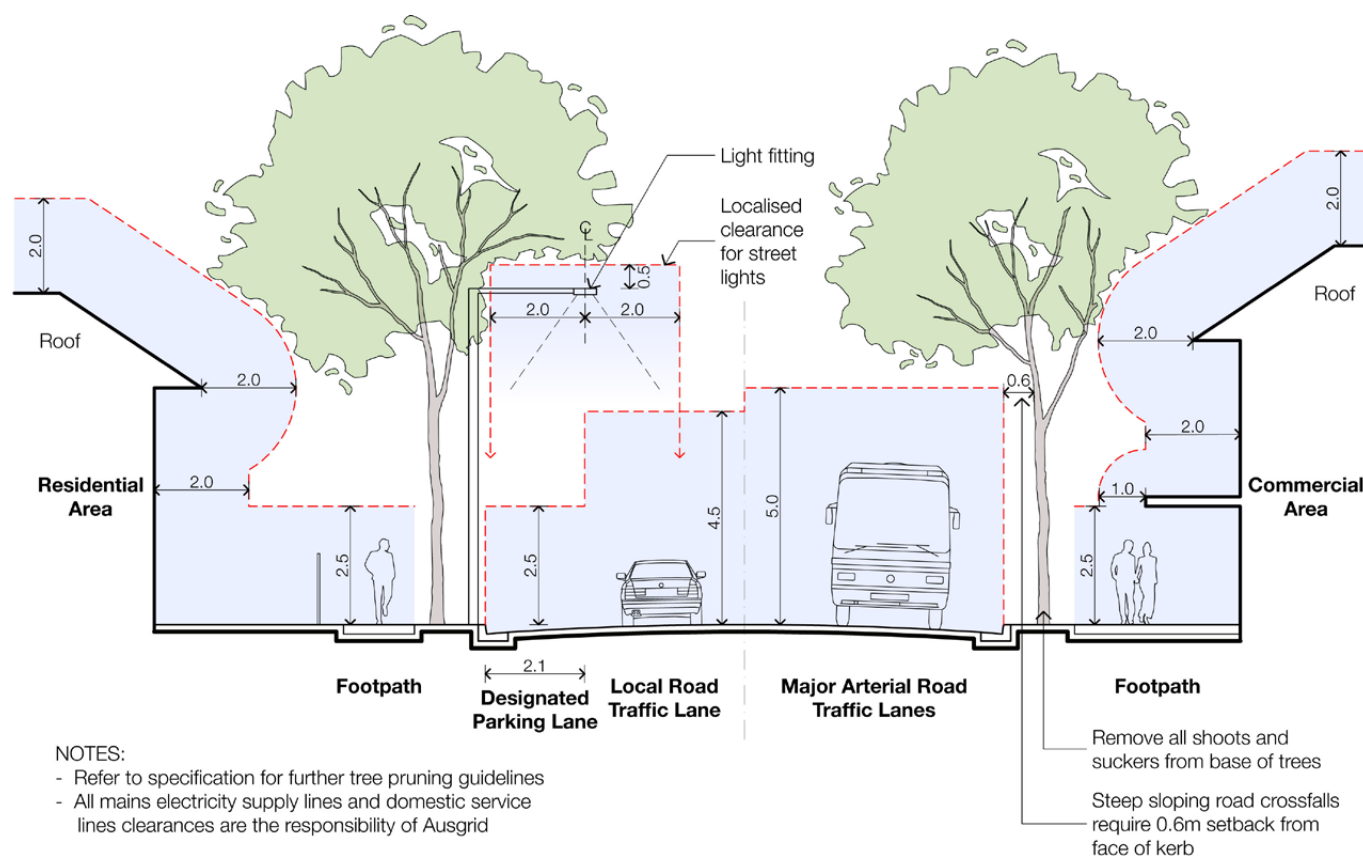


Figure 1.18 - Marrickville Council - Tree Pruning Clearance Diagram

1.8 Tree Removals, Replacements and Implementation Strategies

Overview

Council aims to continue existing street characters and tree planting as much as possible, unless there are specific issues or problems to address or there are clear opportunities for streetscape or canopy cover improvements. Generally speaking, Council will not consider leaf, fruit, sap or bark drop or bird and bat droppings as valid reasons to prune or remove a street tree. These are natural processes of normal tree growth and wildlife.

Council will seldom remove a healthy street tree. If a certain type of tree is proposed for a street within this Plan, it does not mean that Council will remove the existing street trees in the short term to implement any new species. This will only happen gradually over time, as trees need replacing or if a specific opportunity exists to plant a new tree in an otherwise vacant area.

As such, existing street trees, regardless of species will normally be left to grow for their natural life and will only be removed once they have become a safety issue, an unacceptable hazard or ongoing remedial tree or infrastructure works are unviable. The exception to this policy may be when major street improvements or upgrade works are required or there is specific plan to revitalise a street or area. Even then, unnecessary tree removal will be avoided where possible.

Street Tree Removals and Replacements

Council will aim to maintain and conserve the overall canopy coverage within the LGA. Council will remove street trees in the following circumstances.

- The tree is dead or dying
- The tree is assessed as being hazardous due to recognisable structural or health defects and where remedial or selective pruning cannot eliminate the risk, or where such pruning will leave the tree unacceptably disfigured or poorly formed
- The tree is causing public Infrastructure damage which is considered significant and can not be overcome by other reasonable and practical measures
- The tree is causing significant damage to significant private structures. It will typically be a requirement to positively establish that the tree is causing the damage and that the damage is significant and that continued and future damage cannot be overcome by other reasonable and practical measures.
- Any other reason, at the discretion of Council's staff which can be justified by either technical or legal grounds according to particular circumstances.

In regard to the above, significant damage is a relative term, and will usually be assessed with respect to the likelihood of repetitive repairs and the relative costs compared to the amenity value of the individual tree. For example repairs or replacement of footpath pavements or kerbs once every 10-15 years due to tree root growth would generally be considered acceptable. However, the replacement of a footpath every 2-3 years and a tree that will continue to substantially increase in size would indicate that the tree is generally unsuitable for the location.

Likewise, it is also necessary to consider the severity, age and nature of any private property damage and how quantifiable the damage is being caused solely by the tree. If the structure is a relatively minor outbuilding, or landscape wall or the suitability or quality of construction is questionable, it may be of greater

over-riding benefit to retain the tree as the more significant item. Obviously, if the damage is clearly related to the Council's tree and is affecting the structural integrity of a dwelling or other important structure, then clearly tree removal must be considered. As a rule this will generally be determined on a case by case basis.

The removal of a tree is generally not considered justified when damage is restricted to minor works such as unit paving, fencing or footpaths and driveways or to deteriorating sewer or drainage lines where reasonable and practical repairs can be carried out. This is a principle largely upheld by the NSW Land and Environment Court.

Where a street tree is removed, Council will install a replacement tree at or very close to the removal site. They will follow the spacing and placement guidelines outlined in this document and may locally adjust the placement as needed. The replacement species shall be as outlined for that particular street in the Master Plan. Where a choice of species is provided the species selected will take into consideration the localised environmental, functional and aesthetic aims and the reason for the previous trees removal. The species selected shall be at the sole discretion of the Council.

Where practicable and feasible the Council will notify the affected residents of planned tree removals and replacements in accordance with the table below:

Removal Activity	Consultation
Minor Street Shrub Removal (including trees up to 5m)	<ul style="list-style-type: none"> • No prior notification • Notice to 3 adjacent properties stating reason for removal
Standard Street Tree Removal	<ul style="list-style-type: none"> • 14 days prior notification to adjacent properties and those opposite • Notice attached to tree • Proposed tree removal included on Council's website
Emergency Removal	<ul style="list-style-type: none"> • No prior notification • Advice on Council's website

Proposed New Street Tree Planting Strategy

The implementation of any new street tree planting needs to be carefully planned and considered. New street planting will typically not be installed under the canopy or within very close proximity to larger and overhanging trees (either street, park or private). The resulting habit and condition of the newly planted tree is severely compromised, often resulting in a substandard tree form and future maintenance issues. Council officers prior to the finalisation of any planting program will assess this sort of conflict.

Unauthorised Planting on Council Land

Council may identify situations where residents' plant trees on the Council managed road reserve without the written approval of Council. Although these are sometimes suitable trees, there are a range of issues relating to insurance, public safety, environment and the integrity of overhead and underground services that must be considered.

Council does not permit planting of trees on Council land by persons other than Council staff or contractors and Council may remove any such trees.

Tree Vandalism or Unauthorised Pruning

In accordance with Clause 5.9 of the Marrickville Local Environmental Plan 2011 it is an offence to damage or remove a Council street tree. Any persons found guilty of tree vandalism will be prosecuted.

1.9 Tree Procurement

Considerable effort and resources can be spent in planting new street trees. This considerable effort can be wasted if the tree dies shortly after planting or if the tree is supplied in a substandard form or condition that may ultimately lead to poor performance or the later development of serious structural defects and poor health. As outlined by authors such as Gilman (Gilman 2012), most tree defects that occur in mature trees were present and identifiable at the time a tree was initially planted. It is therefore essential that the tree is in optimal condition when delivered and planted.

An important aspect of the implementation of this STMP will be also to improve the way Council plans for, and procures its nursery stock. Implementing a more 'forward-thinking' and pre-planned approach to plant procurement has numerous benefits, which include: -

- Securing favourable contract growing prices.
- Ability to prepare and coordinate planting at optimum times of the year.
- Ability to purchase trees of the required species and cultivars.
- Ability to purchase trees of the required sizes and dimensions and formatively pruned to suit street tree installation.
- Assurance of the required quantities, including allowance for replacements when necessary.
- Ability to inspect and demand quality stock free of above and below defects.

In summary, all trees to be provided to the Council should be part of an advanced plant supply contract with one or more reputable suppliers and they should conform to the NATSPEC "Guide for assessing the quality of and purchasing of landscape trees" by Ross Clark 2003. The specifications outlined in Section 6.4 of the STMP detail the specific requirements for the supply and transportation of trees. Council should undertake inspections of stock prior to, or upon delivery, and reject any trees that fail to adhere to these specifications.



Figure 1.19 - Quality control of trees supplied for planting is critical to the success of any planting program. Many defects are present at the time of planting and they can be either rejected or the problem easily rectified before it becomes a major problem when the trees reaches maturity.



Figure 1.20 - Advanced growing contracts of trees allows for the proper supply of plants in the varieties, sizes, quantity and quality that Council requires.

1.10 Action Plan and Priorities

This Master Plan provides Council with a clear direction to the ongoing management of street trees in the Marrickville LGA. Specifically, this document recommends the following key priority areas to be targeted by Council in its management of the street tree resource:-

- Commitment to long term strategies to increase the canopy cover within the Marrickville area.
- Reinforcement and improved tree planting along the identified major road corridors (refer to Section 4).
- Identification of streets where the implementation of ABC (Aerial Bundled Conductors) overhead wiring should be budgeted and prioritised (refer to Section 6.2 for detail).
- Investigation and implementation of further in-road planting opportunities particularly in narrow verges or in very wide streets with small trees. (refer to Section 3.7 and 6.3).
- Maintenance and continuation of the existing in-road planting.
- Implementation of improved approaches and methods to tree planting techniques with particular focus on achieving greater soil volumes for trees, more generous tree surrounds, integration of paving, services and tree planting and appropriate species selection.
- Greater scrutiny of proposed new and replacement planting sites based on the expected and ultimate size of the tree and assessment of the surrounding key infrastructure and services clearances.
- Improved procurement of tree stock with a defined and managed approach using forward planned installation periods, advanced ordering of quality plants in suitable sizes and adherence to the proposed species and cultivar palettes.
- Proactive maintenance practices such as formative pruning and mulching around the base of young trees to achieve good quality, well structured and low maintenance trees well into the future.

The above priorities will also require a commensurate commitment from Council, Council staff and the wider community. Appropriate funding, both recurrent and one-off capital injections will need to be provided as part of this Plan to achieve the objectives and allow the implementation of key priorities.

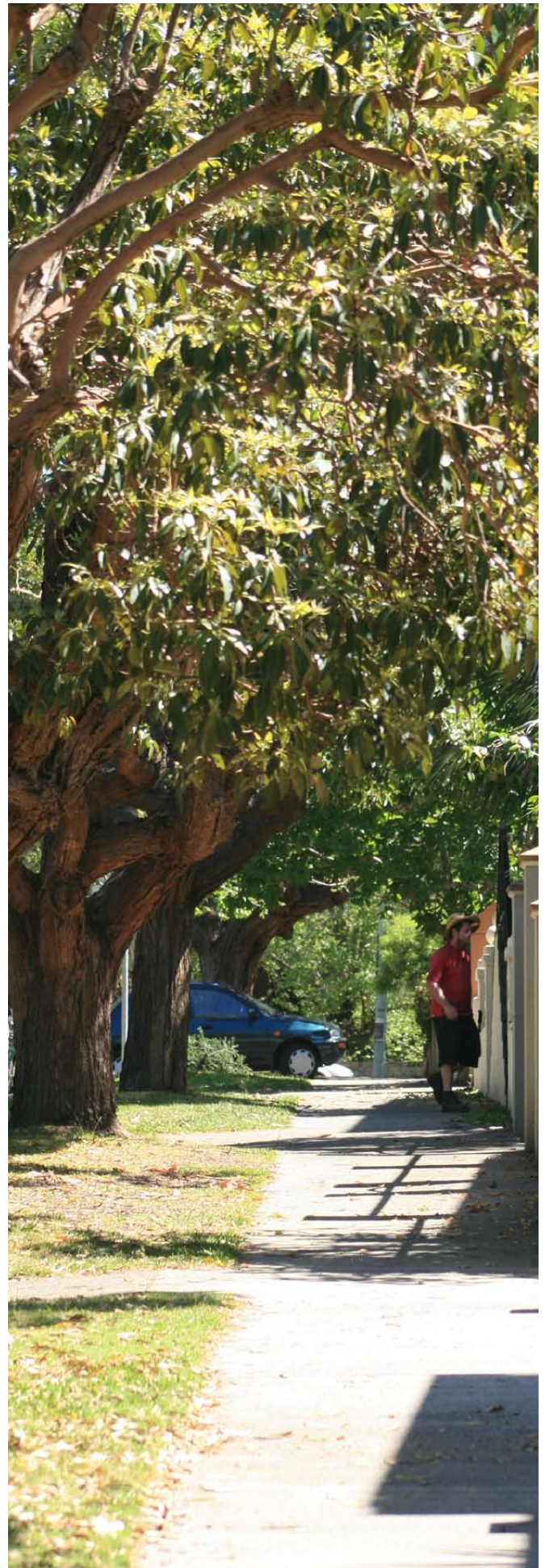


Figure 1.21 - Good streets require good planning. To achieve great street trees in the future will require ongoing commitment and appropriate funding