3.0 Street Tree Design Guidelines

3.1 Overview

As a collective asset, street trees are considered and planted to reinforce the public realm and landscape design principles. In a heavily urban context like Marrickville the emphasis is commonly to:-

- Provide more consistency and visual uniformity for each street;
- Enhance the local character of distinct streets or areas by introducing a precinct based planting approach;
- Reinforce and celebrate key corridors and nodal intersections;
- Enhance key cultural and commercial sites and
- Allow the adjoining landscape to take precedence over the street tree planting where existing parks adjoin the street.

In adhering to these design principles consideration must be given to sites specific conditions that will determine an individual tree's placements. These include footpath and verge widths, sight-line clearances, underground utilities, overhead wires etc. An overview of these considerations is provided in the following pages. Some of these issues are also outlined in far more specific detail in Appendix 6.4 Street tree supply and installation specifications and Appendix 6.5 Typical street planting details.

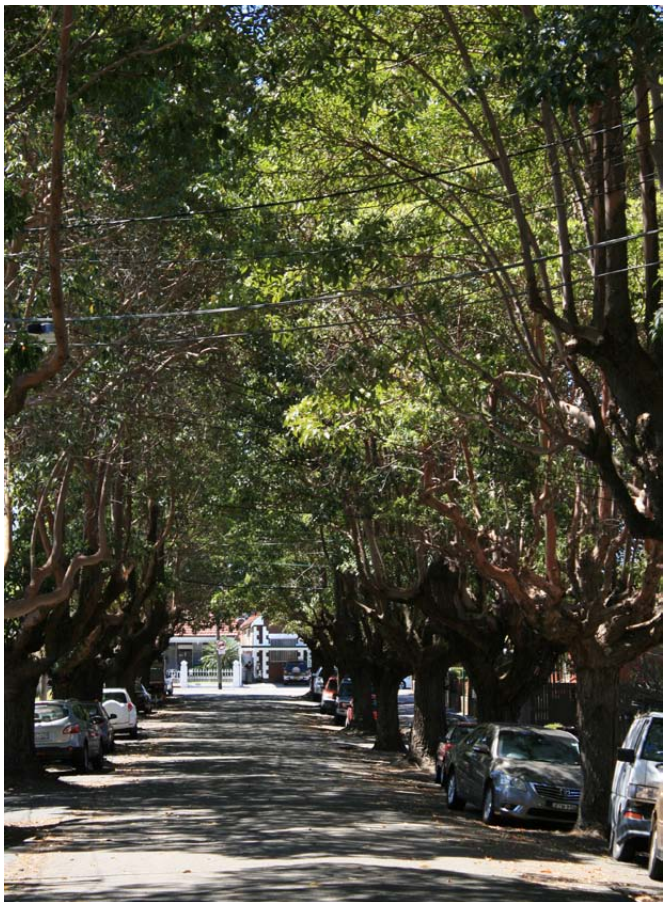


Figure 3.1 - A distinctive avenue of Lophostemon confertus (Brush Box) at Harney Street, Marrickville (Photo Arterra)

Consistency and visual uniformity for each street

The intention of this principle is to establish a more uniform visual character for each street, creating a sense of identity or 'sense of place' that compliments the surrounding architectural forms and provides streets with a distinctive and recognisable character. Inconsistent street plantings with a large number of different species may be appropriate and can add interest to some special streetscapes. However, they are often more difficult for Council to manage and may not be appropriate in many locations.

In many cases the proposed species will be an extension or continuation of the dominant existing species, if that species has been deemed to be suitable in scale and growth habit.

Precinct based approach

Related to the principles of a more consistent and coordinated theme for individual streets is the concept of 'precinct' planting. All new planting will be based on a precinct approach where tree species selection and planting will help reinforce the distinct physical character of each area and be responsive to its more unique environmental conditions.

Mixed Species

Most streets have been designed to have a small mixture of species. This may, for example, be in the form of one side of the street being a smaller species to fit under overhead wires and a larger species on the other side where absence of services and verge space permit. The number of species in each street has been limited as the management of single or relatively few species per street is far more efficient for Council. Issues such as tree supply, tree planting, tree maintenance and street cleaning frequency are all more difficult with highly mixed species streets.

Some streets may also benefit from a planned alternating mix of species. These are usually designed to cater for the continuation of a pre-existing street condition and importantly to balance the provision of native and exotic trees and/ or deciduous and evergreen trees. Attempts may be made to alternate the two (or more) species to provide for the designed intention of the mixed species street.

The selection of which of the species to plant and the exact location within the street shall be at the sole discretion of the Council. Individual requests by adjoining residents for one or other of the species will typically not be accommodated.

Increased Canopy Coverage

Subject to verge width and constraints such as overhead power lines and building setbacks, larger growing street trees will be selected wherever possible. Too often small trees are planted on both sides of a street, when a larger growing tree could have been planted on the non-wire side of the street. A larger canopy tree contributes to the aesthetics of the street and overall environmental performance.

There is much opportunity in many of the industrial streets within Marrickville LGA to plant larger growing but potentially well spaced trees. Often verges in industrial areas are quite wide and building heights would allow the canopy of a large tree to grow over head with minimal impact to owners. Frequently in the industrial areas there is limited on-street parking available which results in many vehicles being parked on the verge, which can lead to damage to street trees caused by cars or trucks butting

up to them. To avoid damage to new street trees commercial grade tree protection is recommended. By instigating a co-ordinated upgrade of the pavement, soil volumes and installation of suitable and robust tree protection, the planting of a large trees at wide spacings could exponentially increase the canopy coverage these areas.

The aerial photograph in Figure 5.10 illustrates the opportunities to plant more trees in the industrial area of Marrickville where there are currently few trees.

Planting Adjacent to Parks

Many of Marrickville's parks have very prominent boundary tree canopies that often contribute or even extend over the adjoining streets. Introduction of competing street trees along these streets is usually discouraged in order to avoid intrusive impacts on the park and minimise any future canopy conflicts. This also allows larger and more major trees along the park edges to 'read' from the street.

General Solar Access

Street tree species should be selected, where appropriate, that will provide an appropriate level of solar access to dwellings. This applies most prominently to the more urban areas and terrace houses with smaller dwellings on the southern side of the carriage ways.

This becomes less of a consideration where lots are larger and houses are set well back from the street. In these instances the street trees typically have smaller influences and the residents have an opportunity to manage and consider their sunshine and shade requirements within their own gardens and open areas.

Unreasonable requests for tree removal or excessive pruning for solar access will typically be rejected by Council.

Solar panels or Digital Data Receiver Access Considerations

Council shall consider this factor when planning any new tree planting. If a resident already has legally installed solar panel collectors or a digital data receiver and their performance is significantly diminished by a street tree, the pre-existing arrangement should stand. That is, was the tree there first or was the receiver/ panel. If a resident currently relies on solar access for the operation of such a device Council will typically avoid planting a tree that will potentially and unreasonably shadow the device by relocating the tree or planting a smaller tree species. Similarly, if an existing street tree pre-dates the installation of a solar collection or digital receiver device, the Council will not prune or remove the tree to provide for increased solar access.

Driveway Access

Where there is a request to expand an existing driveway or install a new driveway (or other access) to a private property and it requires the removal of a street tree, the following considerations shall be assessed in reaching a determination.

- Are there alternative or options to relocate the driveway?
- How significant and prominent is the tree and its contribution to the local streetscape?
- Is the tree healthy and vigorous?
- Are there suitable alternative locations for a replacement street tree?
- Allocation of removal and replacement costs if a replacement tree is agreed.

Figure 3.2 - Street planting adjacent to established parkland is often not needed and it is better to let the borrowed landscape and larger trees of the park contribute to the streetscape rather than planting small trees that are often crowded and malformed (Photo Arterra)

Figure 3.3 - Street planting should consider pre-existing reliance for solar access, however, when the tree was there before the installation of such devices the owner should not expect that the trees be pruned to facilitate greater exposure. (Photo Arterra)

3.2 Street Tree Precinct Definition

The Local Government Area of Marrickville occupies 1607.9 hectares or 16.079 km2 (excluding the Cooks River Water area). It contains 11 recognised suburbs. The precincts defined in the Street Tree Master Plan are generally based on existing suburb boundaries where possible, but also take into account similar major physical boundaries, street types and widths, residential characters, and heritage conservation areas. Consideration of major physical divisions such as rail lines have also been given priority, as the streets often read and function completely differently on either side of such divisions.

There are twelve street tree precincts defined. Each are similar in size, which responds to Council operational and maintenance functions. The location and extent of the precincts are displayed on Figure 5.1. They are itemised in the following table.

Precinct Name	Area (ha)	% of total area
Dulwich Hill East	117.6	7.3
Dulwich Hill West	107.9	6.7
Lewisham & Petersham North	100.8	6.3
Marrickville Central	149.7	9.3
Marrickville Industrial	170.2	10.6
Marrickville South	209.4	13.0
Newtown North & Camperdown	96.0	6.0
Newtown South & Enmore	95.1	5.9
Newington (Part Stanmore/Enmore/Petersham)	155.8	9.7
Stanmore North	71.9	4.5
Sydenham & St Peters	177.5	11.0
Tempe	156.0	9.7

3.3 Street Typology Summary

Streets are varied throughout the municipality, as one would expect, given the range of periods in which the suburbs were developed. There are approximately 615 separate streets within the municipality (excluding minor laneways). Some are not capable of being planted with street trees due to space restrictions, however most do have opportunities or are currently planted with street trees.

When analysing the current street verges within the LGA:

- 25% have verges less than 1.8m wide and would be described as narrow with many inherent difficulties in planting street trees.
- 73% have verges that are between 1.8 - 3.5m wide and would be considered small and difficult to plant larger trees.
- 3% have verges that are 3.5-5.0m wide and would be considered a medium or average size verge with minimal constraints to street tree planting.
- Less than 2% have verges wider than 5m that would be considered large and provide no constraint to street tree planting.

There are many particularly narrow verges that are between 1.5-1.8m wide, particularly in the Newtown and Camperdown area, that are also fully paved and represent a considerable challenge to street tree planting.

3.4 Locating Trees

There are many limitations to the positioning of street trees on footways immediately behind the kerb. Distances from infrastructure elements such as intersections, pedestrian crossings, light and electricity poles, stormwater inlets, underground service pits and bus stops are important in determining final planting locations. Typically this will require individual site assessment and will be determined on a case by case basis.

Street Tree Spacing

Taking into account other relevant clearance requirements, street trees are to be typically planted as follows:

- small trees – spaced at a minimum of 7 to 10 metre intervals
- medium trees – spaced at a minimum of 10 to 15 metre intervals
- large trees – spaced at a minimum of 15 to 20 metre intervals

Verge and Footpath widths

For the purposes of street tree planting implications, the Council footways or verges are divided into four categories:

- very narrow - less than 1.5m and usually fully paved;
- narrow – 1.5 to 3.5m may be fully paved or with a narrow grass strip;
- medium – 3.5 to 5.0m and usually a combination of grassed strip and paved footpath;
- wide - greater than 5.0m and usually a combination of large grassed strip with or without a paved footpath.

Where verges have grassed portions, the tree shall be planted half way between the kerb and the edge of the concrete footway. This method of planting allows a large area of water penetration to the roots of the tree and avoids some of the problems of pavement lifting by the roots of the tree. It also allows the tree to develop a more natural and radial root pattern. In this instance the species selection is based upon the overall width of the verge from the building/ boundary line to the back of the kerb, (i.e. small trees in narrow footpaths, medium trees in medium footpaths and large trees in wider verges).

Sight Lines and Distances from Infrastructure

It is important that trees are placed within a street with regard to existing or proposed road elements and infrastructure. It is important that trees are placed within the streets to maintain acceptable clearances and sight lines to intersections, signs, light poles, crossings and other road elements. The following table outlines the standards that Council will typically apply with regard to tree placement. These dimensions are for typical streets and may need to be increased depending on the design speed of the streets.

Council may consider alterations to these dimensions when the placement of the tree can be shown to not adversely affect safety or the future integrity of nearby infrastructure. Consideration shall also be given to pre-existing street trees and site conditions. Council will not normally remove a mature tree that has historically been planted within these distances unless the impacts of retaining the tree are found to be unacceptable and can not be otherwise mitigated through appropriate pruning.

Road and Layout Element	Typical Street Tree Planting Clearance
Street intersection - distance from projected line of the intersecting kerb line on approach side	10m
Street intersection - distance from projected line of the intersecting kerb line on non-approach side	7m
Street Light pole - distance of trunk away from centre of pole in plan view	5m
Stormwater inlet pit - distance from nearest edge of pit structure	2m
Driveway - distance from driveway edge on approach side	5m
Driveway - distance from driveway edge on non-approach side	3m
Traffic Lights - distance from signal pole on approach side	10m
Pedestrian crossings - distance from outer edge of crossing on either side	10m (on approach) 7m (on departure)
Street lighting pole - minimum distance from pole to centre of tree trunk (unless there are other light sources to consider)	3m
Cycle ways - clearance from edge of cycleway path to centre of tree trunk	0.5m

Tree Pit Dimensions

As an absolute minimum, an access width of 900mm is needed between the back of any tree pit and the building/ boundary line. Since the minimum practical width of any tree pits is usually 600mm, the minimum width of a footpath that can be safely planted is 1500mm (600mm plus 900mm). This is also subject to the following other conditions: -

- that there are no obstructions overhanging the building line from the front yard of the adjacent property (eg. other trees, shrubs, vines, awnings) and;
- that the lower branches of the tree can be pruned to a height of at least 2400mm.

Further problems occur on very narrow roads where parking is restricted to one side only. Larger vehicles may tend to ride up over the kerb onto the footway to avoid parked cars. In this case trees may only be planted on one side of the street even if the footway is sufficiently wide.

3.5 Approach to Narrow Streets & Narrow Verges

Approximately 10% of streets within Marrickville LGA have a 'very narrow' street and accompanying verge width less than 1500mm wide. Trees planted in footways less than 1500mm wide (from building line to back of kerb) force pedestrians, particularly those with strollers, to walk on the road. It may also totally prevent a wheelchair bound user or elderly person with a walking frame or mobility scooter from using the footpath. To ensure safety and access for all pedestrians is a priority and to encourage pedestrians to stay on the footway the following approach may be adopted regarding street trees and narrow streets with footpaths that are less than 1500mm in width:

(i) Where there are no existing trees (or only a very small number of trees) then Council may discontinue tree planting unless it can be done as in-road planting;

(ii) Where there are existing trees planted in footways less than 1500mm wide, then a replacement will be provided when necessary, but only on one side of the road where the tree can be placed away from overhead wires, thereby keeping a tree-lined street while allowing one side of the street to be the main "accessible" walkway. Council will ensure any new replacement tree is installed with appropriate pavement and soil conditions; or

(iii) Where feasible, convert to in-road planting with some potential minor parking reduction but in return providing fully accessible pathways on both sides and less infrastructure damage to pavement and houses. In-road

Figure 3.4 - Denison Street, Newtown. The tree is a suitable tree species for a small street, however its location in such a narrow verge presents many difficulties and potential liabilities for Council (Photo Arterra)

planting will allow the use of medium sized trees that may provide attractive canopy to the entire street and maintain or improve the overall canopy coverage..

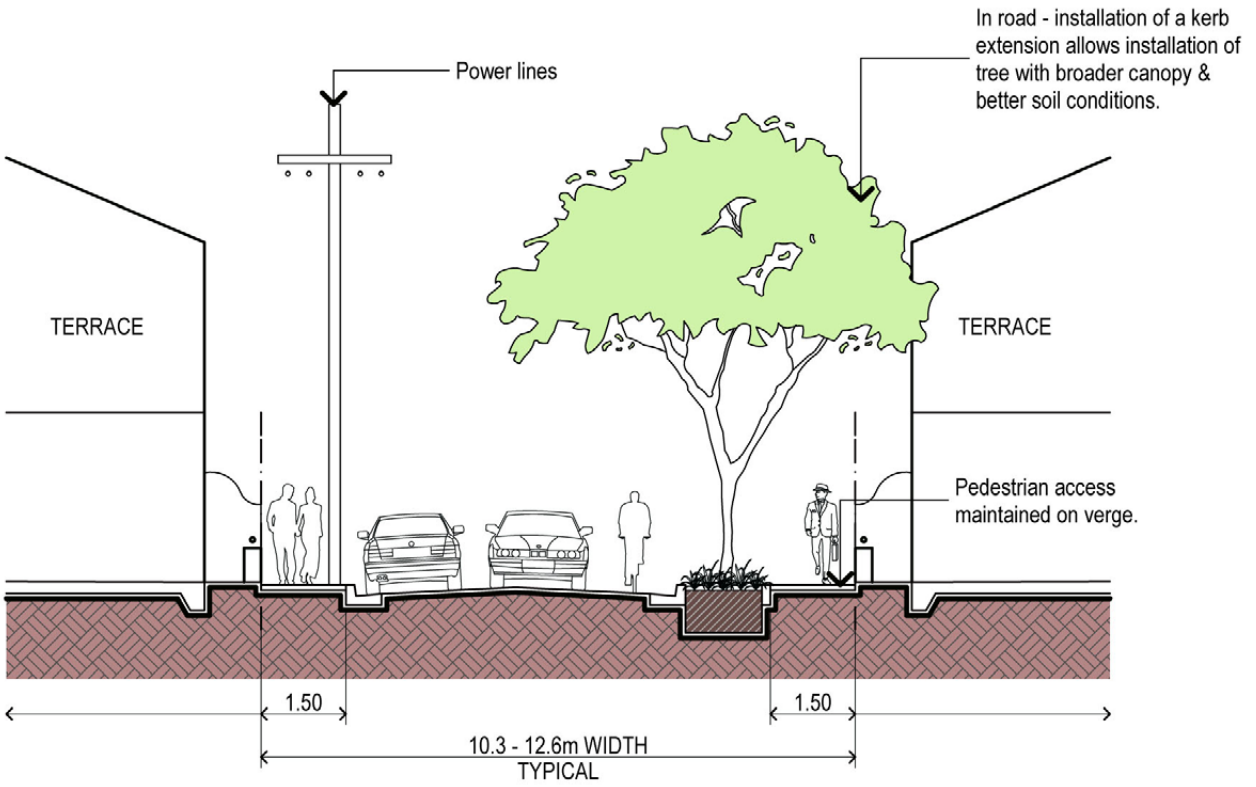
The sections (Figure 3.7) on the following page illustrates the profile of a typical narrow street where in-road blister or kerb extension planting will allow for a broader canopy tree whilst still maintaining maximum pedestrian access to both verges.

Demonstration of Principles - Figures 3.6, 3.7 and 3.8 provide a good example of how the upgrade of a street with narrow verges can benefit a range of Council policy objectives. These include:-

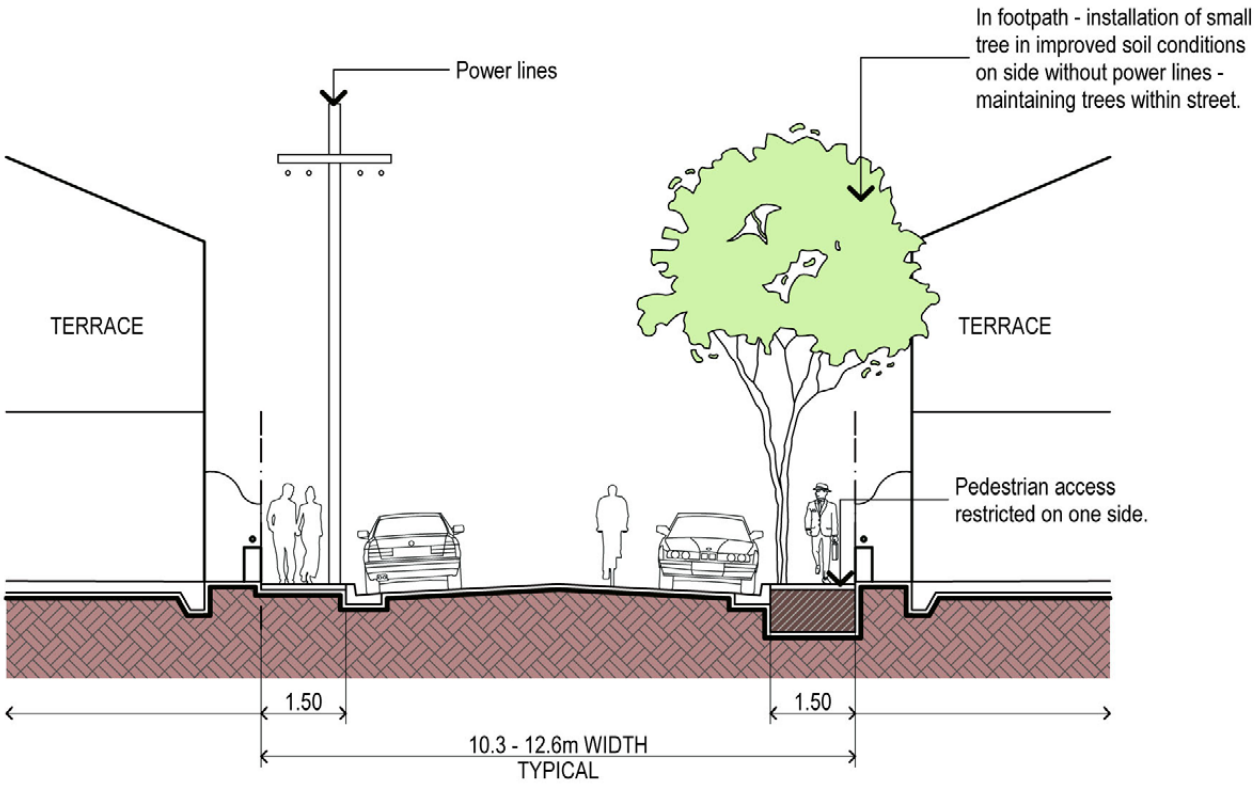
- maintenance or even increases in overall canopy coverage
- providing larger and better formed trees with minimal ongoing maintenance requirements
- moving trees further away from private property and minimising the possibility of future infrastructure and private property damage
- providing disabled and easier access along footpaths
- removing the need to constantly prune trees under the power lines
- Providing for more evenly spaced and consistent street tree planting adding to the character and aesthetics of the street
- In-road planting means fewer but larger trees can be planted and brought out from under the power lines.
- Potentially benefits associated with WSUD / bio-filtration within the tree pits capturing stormwater run-off and passively irrigating trees.

Figure 3.5- Existing narrow street with now existing planting, narrow footpaths and minimal building setbacks (eg. Elswick Street, Petersham.

Figure 3.6- Photomontage showing proposed in road planting in narrow street. (eg. Elswick Street, Petersham)



Narrow Verge - In road planting solution

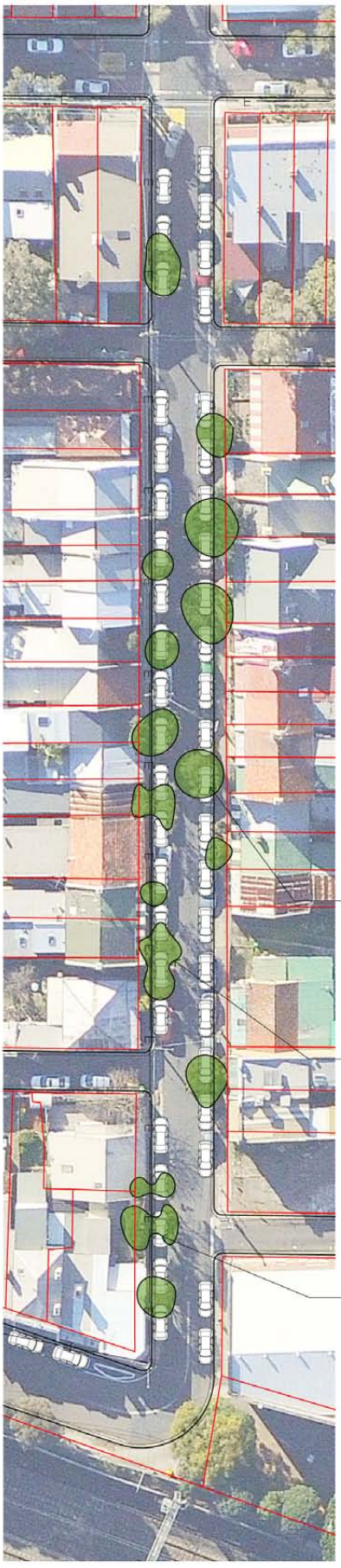


Narrow Verge - In footpath planting solution

Figure 3.7 - Typical street profiles showing proposed location of any future tree planting in narrow streets.

NARROW STREET TREATMENT CASE STUDY - VERGE 1.5m OR LESS WITH EXISTING TREE PLANTING

Existing Conditions



Numbers of cars parked on street = approx **45**

Numbers of trees = approx **17** (uneven spacing)

Measured Canopy Coverage = **316m2** (average of 18m2/tree)

Largest Tree = **6.5m** diameter spread

CURRENT SITUATION ISSUES

Trees heavily and frequently pruned for power line clearance and house clearances, typically lop-sided forms and valley pruned

Trees in very small tree pits, close to kerb line and typically in poor health and condition, numerous impacts / mechanical damage to trunk and branches

Trees damaging footpath and kerb and gutter, creating trip and fall hazards

Trees potentially impacted by cars and limiting car door opening

Trees damaging private property which is less than 1.2m away from trunks

Trees limiting pedestrian, disabled and elderly access, by being too close to boundary and creating trip hazards

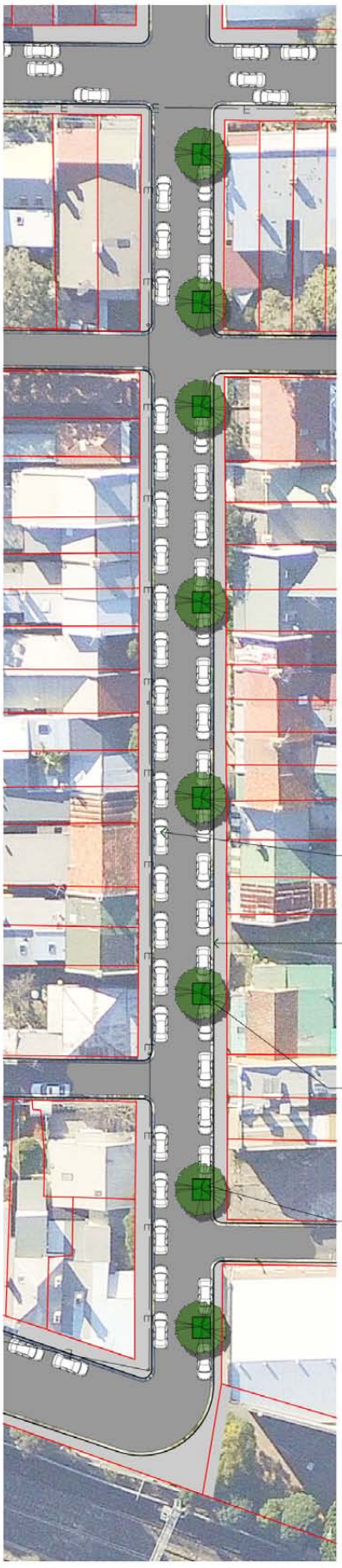
No opportunities for verge gardening, biodiversity shrub planting or WSUD

Existing larger trees on non-power side of street but impacting pedestrian access along street, lifting pavement and overhanging houses

Existing trees under wires, minimal canopy and typically poor health

Existing overhead wires to southern side of street requiring existing trees to be regularly and heavily pruned

Proposed Conditions



Numbers of cars parked on street = approx **43**

Numbers of trees = approx **8** (at 23m spacing)

Measured Canopy Coverage = **304m2** (average of 38m2/tree)

Typical Tree = **7.0m** diameter spread (and potentially larger with minimal impacts)

PROPOSED SITUATION OUTCOMES

Trees typical size and spread larger than existing and maintaining existing canopy coverage.

Trees not pruned for power line clearance and house clearances, typically good symmetrical form maintained.

Trees in good soil volume, purpose built in-road pits and typically in good health and condition.

Trees well clear of the footpath and kerb and gutter.

Trees with increased protection from impacts by cars and trucks and not limiting any car door opening.

Trees with far less chance of damaging private property.

Trees no longer limiting pedestrian and disabled and elderly access, creating trip hazards, pavement longevity increased.

Potential opportunity for shrub planting around bases and biofiltration/ passive irrigation of trees from stormwater.

No tree planting under wires. Path left open for pedestrian access

Trees positioned to avoid conflict with existing driveway crossings if already existing and relatively regularly spaced to provide 3-4 cars to be parked between pits.

Existing trees progressively removed and replaced with in-road planting into 2.1 x 2.5m tree-planting pits. Incorporate drainage and bio-filtration where slopes and drainage infrastructure permit

In-road planting pits located where parking is already limited and positioned far enough from corners to permit garbage truck and other service vehicle access around corners

Figure 3.8 - Demonstration of the potential narrow verge tree planting solution.

3.6 In-Road Planting and Water Sensitive Urban Design

Many roads throughout the LGA have opportunities for additional and larger street tree planting, if the planting is located within the vehicular carriage way rather than the footpath or verge. This also allows trees to be planted in streets that have narrow footpaths or where overhead wires that otherwise present great challenges to achieving successful tree planting.

Any in-road street planting will take into consideration the existing traffic and signage visibility, lot access and parking issues, underlying soil conditions and services. Council will aim to minimise disruptions to, or excessive removal, of parking spaces. Special attention will be paid to achieving appropriate drainage to the tree planting together with adequate soil volumes, road pavement protection, and trunk protection where necessary via bollards or preferably barrier kerbs.

Appendix 6.3 lists the streets that have been identified as streets having opportunities to plant within the road carriageway. The objective here is to plant larger canopy street trees that are away from overhead power lines and also reduce the perceived width of the road carriageway, thereby calming traffic and providing a more aesthetically pleasing street. This also allows trees to be planted further away from adjoining houses, reducing any impact of street trees on adjoining residents. Many of these opportunities could be combined with rearrangement of parking and provisions of perpendicular or angled parking to minimise any parking loss.

Water Sensitive Urban Design (WSUD) opportunities have also been identified, subject to the installation of tree pits, drainage and rain gardens parameters. Note, the viability of in-road planting / WSUD installation to each of the streets identified below is **subject to further investigation** and detailed design including the location of underground services, subsoil drainage, and traffic considerations.

Figure 3.9- Many streets are wide and would lend themselves to in-road planting strategies (eg. Charlotte Ave, Marrickville).

Figure 3.10- Photomontage showing proposed in road planting in Charlotte Ave, Marrickville.

3.7 Power Lines and ABC

Approximately 88% of streets have overhead power lines, which typically affects tree planting on one side of the street. In streets with overhead services, smaller trees will typically be specified to facilitate planting that fits below the cables. Approximately 7% of streets have Aerial Bundled Conductors (ABC). Where ABC is already present or is likely to be reasonable to achieve, larger trees may be specified to take advantage of the ABC opportunities.

Relevant Legislation Regarding Powerlines and Roads

The removal or pruning of street trees is permitted in association with approved road works under sections 88, 107, 138 and 139 of the Roads Act 1993. Council is largely responsible for all planting, removal and maintenance of street and roadside trees.

Declared main arterial or 'State' roads are the responsibility of the Roads and Maritime Services (RMS) (previously the Roads and Traffic Authority). Marrickville LGA contains several 'State' roads that fall under the jurisdiction of the Roads and Maritime Services (RMS). Most of these roads are identified and noted in Section 4: Main Road Corridors.

Ausgrid is the state owned corporation responsible for the electricity network that provides power to Sydney homes. Under the NSW Electricity Supply Act 1995 No.94, Ausgrid are responsible for ensuring street trees (as well as private property trees) are to trimmed to maintain a minimum safety clearance between the tree and power lines. The typical safety clearance distance is 1.5m around bare, low voltage overhead wires and 2m around the power poles. This safety clearance distance may be greater on higher voltage lines.

If trees are within 3m of Ausgrid power lines, only vegetation management workers authorised by Ausgrid are permitted to carry out the pruning work. In theory, trimming is carried out by contractors who follow the Australian Standard AS4373-2007 Pruning of Amenity Trees. Ausgrid also employs qualified arborists to audit the work of their contractors. Each contractor is also supposed to employ arborists to monitor standards and ensure they are maintained.

Installation of Aerial Bundled Conductors (ABC)

From the ground ABC looks like a single thick cable however ABC contains the normal group of overhead services bundled together to reduce the cross sectional area necessary for the provision of overhead services. This method of cabling reduces conflict with trees. Pruning requirements are usually reduced and branches can be trained around the ABC more easily.

Priority for ABC conversion is given to major roads and particular problem streets where the conflicts between trees and overhead services are identified. Marrickville Council and Ausgrid maintain an ongoing program to convert some conventional overhead wires to Aerial Bundled Conductors (ABC), however the cost of this conversion is considerable and is not favoured by Ausgrid due to the reduced life expectancy of the cables.

Figure 3.11 - Pruning for power line clearance can result in a very unbalanced canopy , clearly illustrated above with a Podocarpus elatus (Plum Pine) along Kays Avenue East, Marrickville. Trees need to be carefully selected to either fit under wires or have suitable branch architecture to be shaped around the wires in the long term.