CITY OF RYDE

STREET TREE MASTER PLAN

To inform and direct all street tree planting in the City of Ryde

City of Ryde

Earthscape Horticultural Services

ecological AUSTRALIA

ASPECT Studios™

ADOPTED | 16 APRIL 2013

City of Ryde

STREET TREE MASTER PLAN

Client

City of Ryde

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Executive Summary

The City of Ryde Street Tree Master Plan (STM) informs and directs all street tree planting and aids the City of Ryde and the community in managing and increasing the extent of the Urban Forest.

The Urban Forest includes the collective of trees within streets, parks and reserves and other public open space areas, institutional and private land and National Parks. Currently, street trees represent a relatively small proportion of the overall Urban Forest (approximately 15%), but are a very important component due to their considerable contribution to the visual character and amenity of the area.

The STM is a comprehensive document and planning tool that will be updated by Council over time to reflect the changing priority of objectives and street tree selections.

A recent street tree planting of *Waterhousia floribunda* (Weeping Lilly Pilly) in a narrow street verge in West Ryde. This is a good example of appropriate street tree implementation that is consistent with the STM objectives.

The STM is linked with the City of Ryde's other policies, including the Ryde 2021 Community Strategic Plan, Urban Forest Policy (UFP), Town Centre Plans and the Public Domain Technical Manual. This ensures that the long term goals of the STM will be implemented.

Street Tree Master Plan Outcomes

The **STM**:

- Provides a rigorous and defensible tree selection and implementation tool.
- Ensures the right tree is planted in the right place and management of street trees across the City of Ryde is consistent and to the highest standard.
- Reinforces and apply the objectives of the UFP to ensure tree stewardship across the City of Ryde in all applicable departments.
- Develops a legacy of street tree planting that future generations can enjoy.
- Provides a flexible implementation process that enables community input.
- Fosters community acceptance, support and stewardship of public street trees.
- Incorporates periodic updates, adjustments in Council tree management priorities and objectives.
- Identifies priority opportunities for tree planting in the City of Ryde where successful outcomes are most likely.
- Incorporates street tree planting with ecological habitat connections and water sensitive urban design (WSUD).
- Guides the development of town centre streetscapes.

The STM is a tool that will be used by Council officers and the wider community to determine which tree to plant where.

The **community** has been involved in the preparation of the STM through three **community** workshops. During these workshops, community members challenged the City's approach to street tree planting and provided guidance on the determination of suitable street tree species for the City. In addition to the workshops, a Street Tree Community Survey was conducted over a four (4) month period to gauge community perceptions and expectations on street tree planting. The results of this survey have informed the priority setting within the STM.

A Precinct Approach

The City of Ryde encompasses a very diverse landscape and urban environment that includes extensive areas of natural bushland, creeks and rivers combined with regionally significant town centres and residential communities of a variety of ages. In consideration of this diversity, the STM has been developed using a precinct approach.

Eight precincts have been established across the City, informed by the landscape character, topography and urban fabric. While each precinct has a distinct character and has been considered in detail, it also contributes to the overall integrity of the Urban Forest both in and beyond the City boundary.

Consequently each of the precincts have particular objectives and character types that influence species selection and planting locations within the STM framework. Precinct plans for each of the precincts have been prepared in conjunction with a Street Tree Selection Matrix to guide species selection while the street typology sections determine street planting locations within each precinct.

Priority Areas for Street Tree Planting

Current street tree planting across the City is inconsistent and ad hoc. The STM provides priority recommendations across the City in addition to specific street priority assessment. Streets with the best opportunities have the following characteristics:

- Wide turfed verges with adequate soil volume.
- Relatively gentle slopes for easier maintenance and infiltration of surface water.
- Areas where some street trees already exist (which indicates some receptivity) from the residents living nearby.
- No overhanging large trees from the private domain that will overshadow or compete with establishing trees for water and nutrients.
- No overhead services to restrict growth or limit selections.
- Streets where concrete or asphalt footpaths are only located on one side of the street providing opportunities for street tree planting on the side where no footpath is located.
- Areas where residents are proactively street tree receptive and have approached Council for increased street tree planting.

Consideration has been given to the long term success of all new street tree planting and as a component of the preparation of the STM, a Street Tree Community Survey was conducted to determine community responsiveness to tree planting. This survey, in addition to habitat, urban and landscape determinants have informed the priority areas for street tree planting. Each of these have been assigned a priority ranking of:

Level l - Short range planting program (1-10 years)

Level 2- Medium range planting program (11- 20 Years)

Level 3 - Long range planting program (21 years onwards)

Implementation Action Plan

The Implementation Plan sets out the actions by which the STM will be realised, founded on the Objectives of the Plan. The Implementation Plans are divided into eight City Precincts and define priority areas for future tree planting as determined by community feedback and through a detailed analysis of the City's landscape and habitat corridors.

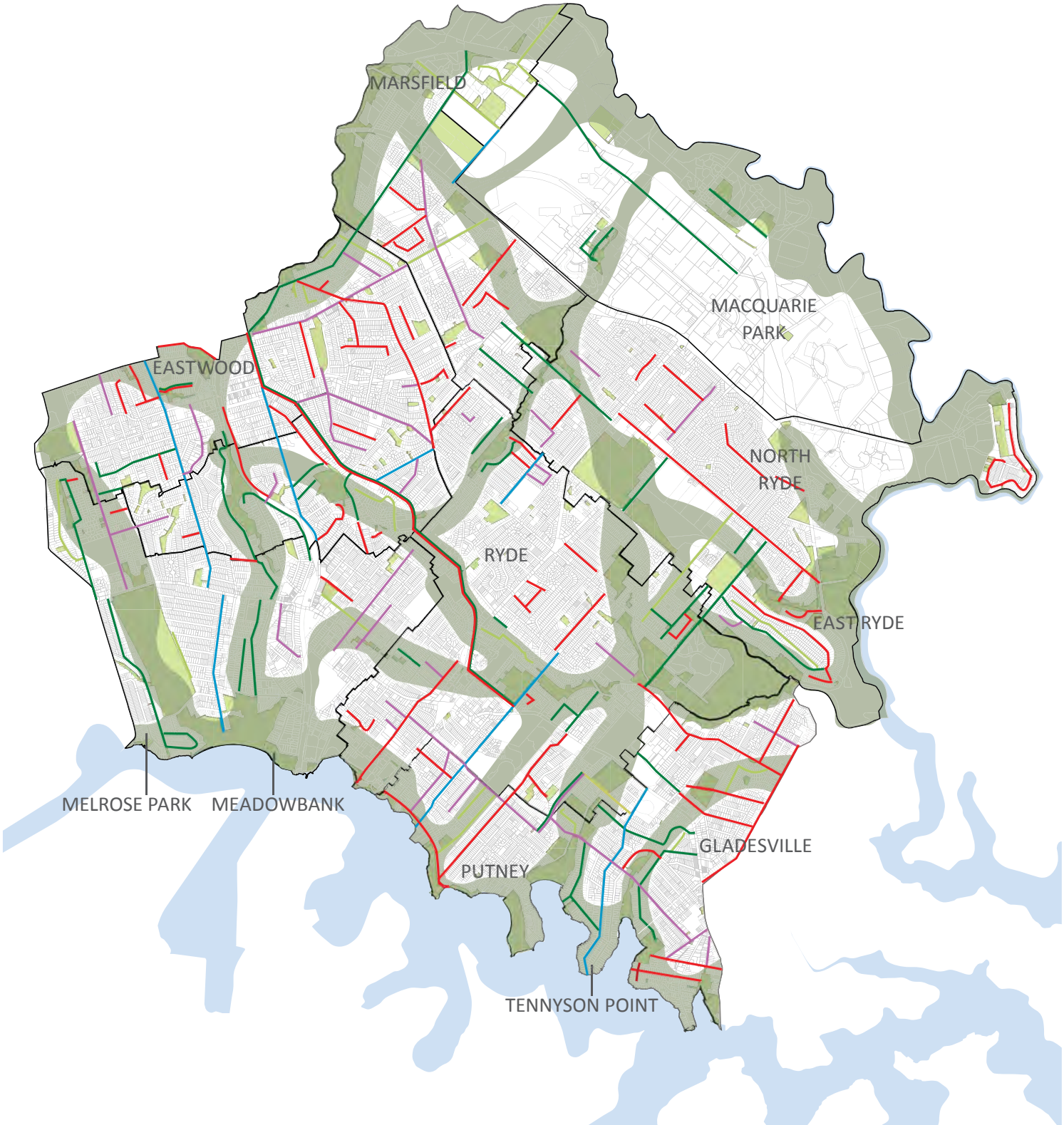


Figure EX.01 - Street Tree Master Plan Implementation in Ryde

Legend

- Precinct Boundary
- City of Ryde Open Space
- Parramatta River
- Habitat Corridor - proposed

Planting Initiators

- Community High
- Community Low
- Habitat High
- Habitat Low
- Landscape High
- Urban High

Introduction

Outlining the relationship between the Street Tree Master Plan, Urban Forest Policy and other relevant City of Ryde policies.

Introduction

The City of Ryde Street Tree Masterplan (STM) is designed to provide a 'blueprint' for the long-term planning and management of street trees. It promotes street tree planting and prescribes a sustainable tree population that will develop amenity and visual character for the City. These are values consistent with the Seven City Outcomes.

Long-term planning is needed to ensure street trees are appropriately selected, planted, maintained, removed and replaced when required. The selection of appropriate species for street planting should be governed by the overriding principle of selecting the 'right tree for the right place'.

Trees in urban environments must be selected to cope with difficult growing conditions. These *Pyrus calleryana* (Ornamental Pear) are highly suited to this street in West Ryde.

The STM palette has been selected through a rigorous process where long-term tree performance and increased canopy cover are the principle objectives.

The STM will:

- Support consistent management of street trees across the City of Ryde.
- Reinforce and apply the objectives of the Urban Forest Policy (UFP).
- Embed the UFP within Council's Strategic Policy Framework to ensure tree stewardship across the City of Ryde.
- Provide a flexible implementation process that enables community input and to foster community support and ownership of street trees.
- Provide a rigorous and defensible tree selection and implementation tool.
- Reflect current tree management priorities and objectives within the City of Ryde.
- Identify opportunities for successful tree planting in the City of Ryde.
- Incorporate street tree planting with ecological habitat connections and Water Sensitive Urban Design (WSUD) objectives.
- Guide the development of town centre 'treescapes'.
- Identify the character of the STM Precincts to ensure that future street tree planting is appropriate and maintains the precincts' inherent character.
- Develop a legacy of an Urban Forest that future generations can enjoy.

How to Use This Document

The information in this document is structured to make the decision making and the process of street tree selection easily qualified and clearly understood.

Background

- Explains the current issues in the City of Ryde, existing site conditions, historical appreciation.
- Includes the findings of the Detailed Street Tree Audit and its implications on the Urban Forest across the whole of the City of Ryde Local Government Area (LGA).

Street Tree Strategy and Selection

- Identifies the management issues impacting the street trees in the City of Ryde and offers strategies that respond to these.
- Provides an analysis of the tree selection methodology including a detailed selection criteria for future street tree planting in the City of Ryde.

Street Tree Master Precincts

- Defines the specific street tree master planning objectives and action plans for the City of Ryde Street Tree Master Precincts.

Implementation of the Master Plan

- Outlines the principles that guide street tree planting, such as ecological goals, services, main roads and town centre treatments.
- Defines overall implementation plans for the City of Ryde.

Technical and Tree Installation

- Provides specifications and recommendations for management, best practice planting and maintenance.

Definitions

- Definitions for terms and phrases used within the STM.

Appendix

- Street tree species list.

Pre-WWII street tree avenue plantings provide an ongoing legacy that is enjoyed by residents of Ryde. They also provide a distinct and pleasing contribution to the street and neighbourhood character.

The use of the columular *Pyrus calleryana* (Ornamental Pear) in the West Ryde Town Centre, where most buildings have awnings, is a good example of appropriate species selection in a constrained environment.

AIMS OF THE MASTERPLAN

- Identify the existing streetscape character of the City and the current opportunities and constraints affecting street tree management.
- Design streetscapes informed by these challenges and constraints.
- Select appropriate tree species, suitable to the environmental conditions and the functional requirements of the site 'right tree right place principle'.
- Provide specifications for street tree planting and establishment maintenance for a variety of street configurations.
- Provide strategies for long-term removal and replacement of street trees.
- Allow for a flexible and adaptable master planning process that allows for changes in Masterplan objectives and site specific conditions.
- Ensure the management of the City's street tree population is in alignment with the Urban Forest Policy and Plan.
- Foster increased community support for street tree planting programmes and funding.
- Increase the street tree population within the City of Ryde.
- Increasing the public Urban Forest extent.

OBJECTIVES OF THE MASTERPLAN

The STM provides the following objectives that respond to the challenges and opportunities found within the City of Ryde's varied streetscapes. It is intended that these objectives are both positive and proactive for the long-term rollout of new street tree plantings.

The objectives include:

1. Identify Existing Street Tree Character and associated Opportunities and Constraints

The STM analyses the existing street tree population through aerial mapping and on-site street surveys. The character of the precincts is often defined by the trees in public open space and in the private domain, including historic tree plantings. This analysis of the Urban Forest guides the character statements.

The key actions include:

- Develop precinct character statements to describe the current extent and character of streetscape;
- Identify the extent of trees within the public domain and private domain across the City of Ryde through aerial mapping;
- Analyse the location of street tree planting opportunities; and
- Ensure future plantings enhance existing street character.

2. Improve Streetscape Design - Challenges and Opportunities

The streets of the City of Ryde have many challenges to tree planting, principally as a result of overhead services. There are, however, many opportunities for street tree planting, where these services are not found. There are also opportunities to modify the geometry of streets to provide wider verges for tree planting.

The key actions include:

- Explore street layout and geometry, including on-street parking and kerb position, to create opportunities for tree planting;
- Reduce the conflict between services and street trees by investigating options for tree selection and planting adjacent to or beneath services;
- Explore alternative landscape opportunities (e.g. taller shrubs) in areas of significant conflict between trees and services; and
- Determine the appropriate design strategy and street hierarchy whilst allowing flexibility for effective long-term implementation.

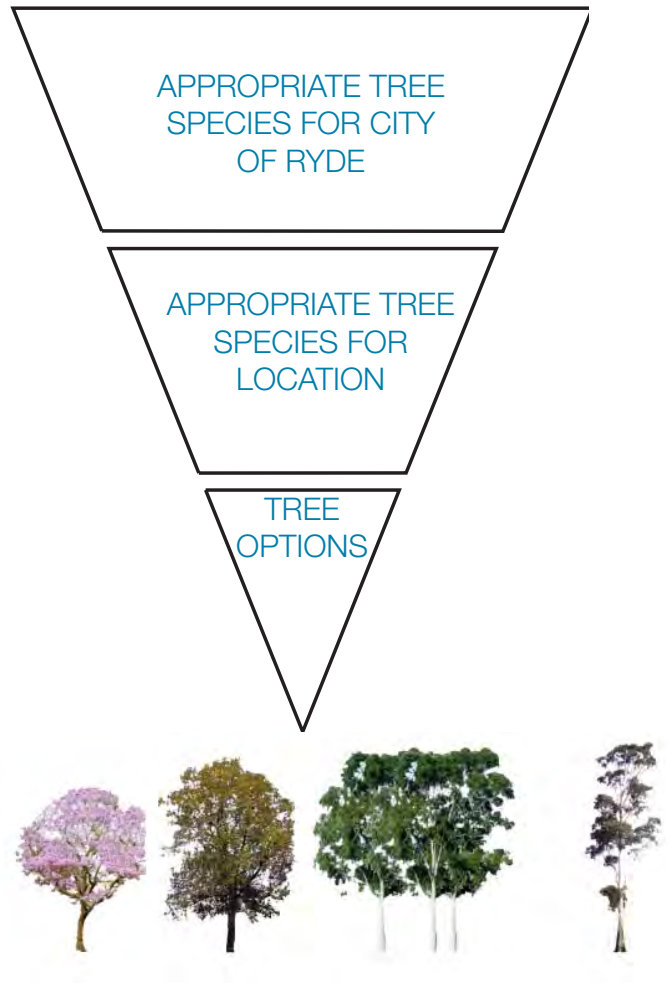


Figure IN.01 - Tree Selection Diagram

A simplified diagram of the street tree selection process for the City of Ryde.

3. Provide Tree Selection Criteria and Planning - A Non-subjective Approach

The STM tree selection is underpinned by performance-based criteria, with tree suitability scrutinised by involvement of the project arborist.

Key actions for this objective include:

- Develop species selection criteria to ensure the key master plan objectives are achieved.
- Develop a flexible and adaptable master list of trees appropriate to the local street conditions.
- Develop street tree character statements for the Street Tree Precincts.
- Provide the framework for periodic review of species performance and revision of the species master list accordingly.

4. Include Specifications for Tree Planting and Maintenance

The STM includes a chapter on the best practice for street tree planting and maintenance. Numerous street type planting arrangements are provided, including current innovations.

This lone specimen of *Eucalyptus cinerea* (Argyle Apple) on Yaralla Road at Kissing Point Park, gives a memorable character to this foreshore park.

Maintenance is a fundamental component of managing the Urban Forest and direction is provided on the maintenance regime of newly planted and existing trees.

Key actions for this objective include:

- Develop best practice tree planting specifications and methodology to mandate a consistent approach.
- Provide information on the most efficient and effective methods for tree planting and maintenance.

5. Consider Long Term Street Tree Management - Removal and Replacement

The removal and replacement of street trees is a key process for managing the Urban Forest, however it is also a politically sensitive issue. Clear communication, education and consultation with the community is essential.

Key actions for this objective include:

- Inform the community of the importance of proactive and best practice tree management and the need to replace trees that have over matured or become hazardous to the public.
- Inform the community in advance of the strategies for necessary tree removal, replacement and succession.
- Embed street tree planting as a component of footpath expansion and renewal projects.
- Inform the community of the unacceptable and real risks associated with hazardous trees that may endanger the public. Reassure that trees can be replaced in-situ or with offset planting.
- Reassure the community that historic planting will be pro actively managed and will include planning and management of removal and replacement when required.
- Inform the community that the replacement species will be appropriate for each location.

6. Provide a Flexible and Adaptable Master Plan

The Urban Forest is a dynamic and changing asset. It is affected by the ongoing maintenance regime, climate change, emergence of pathogens, community opinion and experience with species and suitability. Consequently the STM needs to adapt and be flexible.

Key actions for this objective include:

- Develop a street tree master plan based upon measurable and defensible selection criteria.
- Provide a preferred species master list document in electronic format that is able to be reviewed and updated by council.

7. Include the Community in the Street Tree Master Plan Process

Community understanding of the STM has been achieved through involving the community in the decision making process. Ongoing support for the STM will be facilitated by keeping the community informed and allowing choice consistent to the STM goals.

Key actions for this objective include:

- Implement a proactive and positive community consultation approach that is non-subjective and non -emotive and provides choices for more effective and defensible implementation.
- Take a leadership role in developing community support for street tree planting along residential streets.
- Facilitate street tree planting by the community through establishment of planting and species guides.
- To base the roll out of the STM planting program on community responsiveness and wider tree planting objectives.

8. Align the Street Tree Master Plan with Council Policy

The long term success of the STM and funding for tree planting relies on close coordination development and environmental policies.

Key actions for this objective include:

- Identify the clear connection between the STM and the Urban Forest Policy.
- Encourage clear communication and coordination between Council Policies that have objectives consistent with the Ryde 2021 Community Strategic Plan and the Integrated Open Space Plan.

9. Foster Increased Community Support

Community support will help Council determine priority of the long term implementation of trees.

Key actions for this objective include:

- Define and advocate the amenity, environmental, ecological, social, economic and cultural values of the Urban Forest.
- Prioritise street tree planting within areas where the community supports street tree planting to facilitate a sense of community ownership and responsibility.

A variety of species provides a tapsetry of colour and texture across the City.

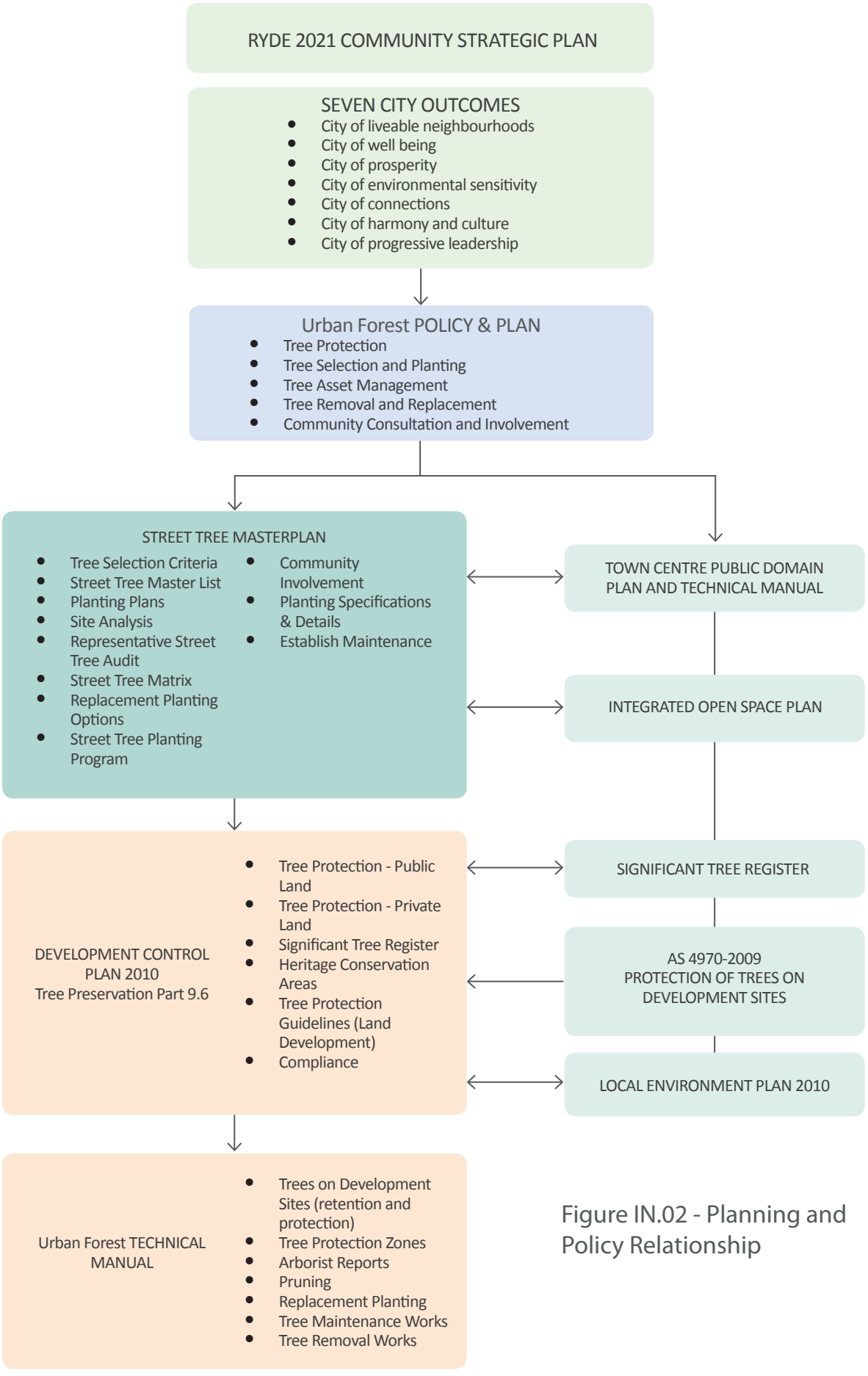
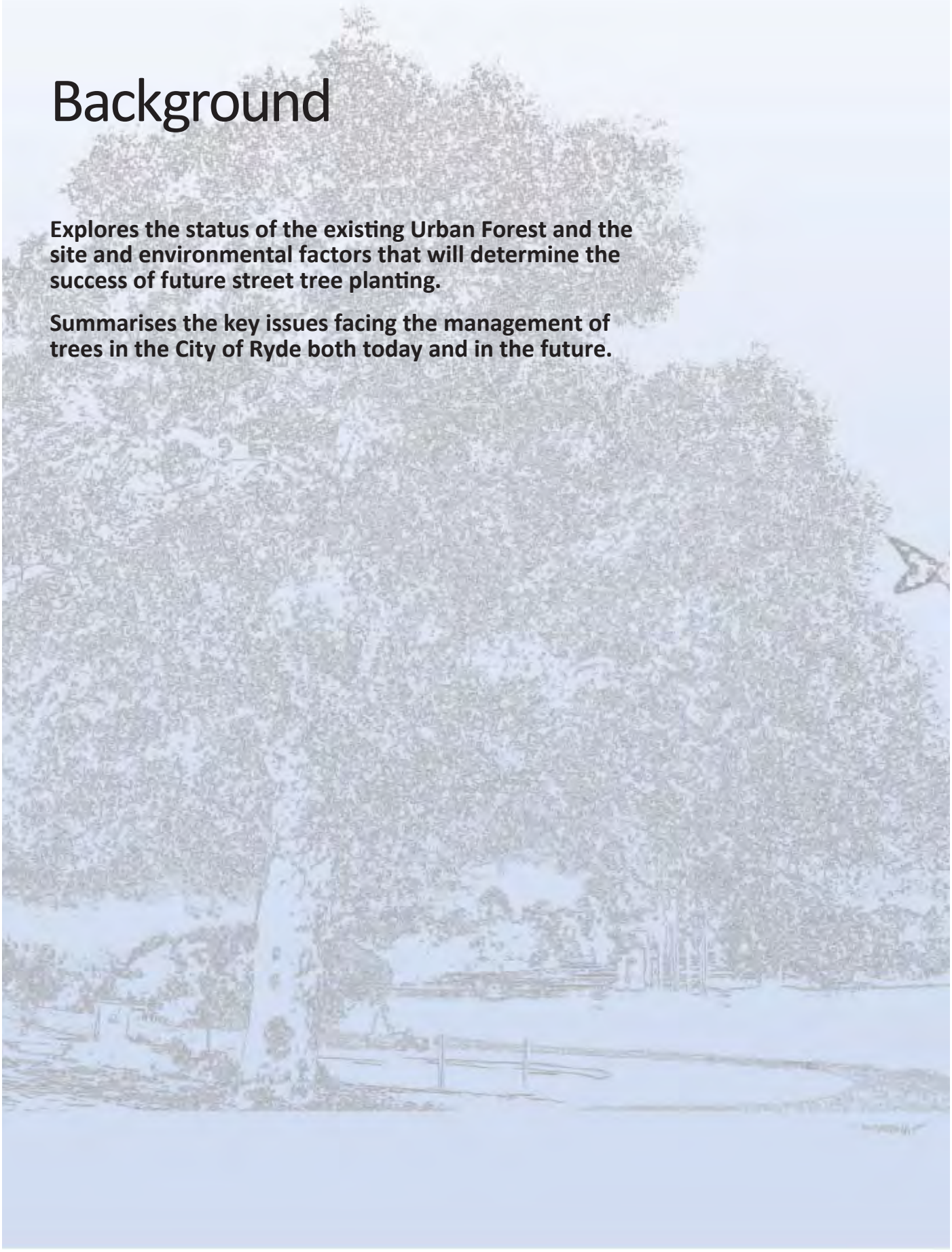


Figure IN.02 - Planning and Policy Relationship

Background

Explores the status of the existing Urban Forest and the site and environmental factors that will determine the success of future street tree planting.

Summarises the key issues facing the management of trees in the City of Ryde both today and in the future.



Background

THE URBAN FOREST

The Urban Forest of the City of Ryde includes all the trees in parks, bushland areas (Council Reserves and National Parks), public streets, private residences and large institutions both government and private.

The distribution of vegetation across the Ryde Local Government Area (LGA) varies, with some suburbs more heavily planted with trees than others within both the public and private domain. Along with the extent of tree planting, the presence and location of parks and bushland reserves heavily influences whether a suburb is perceived as 'leafy'.

The factors that have influenced the size and extent of City of Ryde's Urban Forest cover can be assessed by examining the historical development of Ryde's Urban Forest.

Historical Development

A comparison of present day and 1943 aerial photographic data reveal that the extent of street trees within the City of Ryde has increased in over the past 70 years. However, the City of Ryde is not as well treed as the adjacent Local Government Areas (LGAs) of Lane Cove and Ku-ring-gai. These differences can be accounted for by reviewing the historical land use patterns of the City.

Prior to its redevelopment for residential housing, the City of Ryde was predominantly used for agriculture because its proximity to the Parramatta River and the good quality soils. The original vegetation was extensively cleared to provide for these agricultural land that included orchards and market farms, which were particularly prevalent in Putney, North Ryde, Denistone East, Marsfield and Macquarie Park.

During the 1920's and 1930's Australian rainforest and Myrtaceous species were planted throughout the City of Ryde. Shade providing Brushbox and to a lesser extent exotic Camphor Laurel dominated avenue planting across the City at the same time. This period of planting has contributed to many of the mature street tree plantings however due to age of these avenues, some have been replaced with recent plantings of smaller *Callistemon* and *Prunus*.

During the 1970's the resurgence of interest in native plants contributed greater species diversity to City streetscapes. The use of Eucalypt species such as Tallowwood, Wallangara White Gums and Peppermints were particularly popular. Many of these species have since been proven to be susceptible to pests and diseases and have relatively short Safe Useful Life Expectancy (SULE) in urban environments.

Views

The dramatic topography of the City offers the community with many significant view corridors. These include views of the Sydney CBD, Lane Cove National Park and water views of the Parramatta River. These views are significant to the Ryde landscape but they are often impacted on by the Urban Forest.

Tension between trees and views is one of the most challenging tree management issues in foreshore areas. Trees blocking views for the private domain is an issue that many councils have been dealing with for the past 50 years. The reasons for increasing conflict with trees and views has resulted from:

- Increases in private property values associated with water/ city views.
- Increasing value attributed to views, vistas and scenery.
- Increase in vegetation in foreshore parks with increased tree planting programmes for amenity.

The maintenance of view corridors is a dilemma that is difficult to resolve and residents will sometimes succumb to acts of vandalism to enhance views. Deliberate vandalism can never

be completely eliminated. The City of Ryde is ensuring that consideration is given to existing view corridors when undertaking future tree planting. There is a need to continually educate the community and discourage any unauthorised resident pruning or vandalism of street trees.

The Integrated Open Space Plan (IOSP) identifies the need to document strategic views from public space and outlines their conservation and enhancement. This process is a high priority task for the City.

Rutledge Street in Eastwood showing the *Lophostemon confertus* (Brushbox) lined streets within the verge at that time unpaved. Some of these trees still exist. (Approximatley 1950)

The strong pattern of *Lophostemon confertus* (Brushbox) planting Avenues in Eastwood in 1943. This sets up a historic precedent of maintaining these tree lined avenues.

Community notification and questionnaires will continue to help guide future tree planting programs to ascertain if the community adjacent to public view corridors would be receptive of tree planting, particularly if the trees were not blocking key public views.

Urban Forest Distribution in the City of Ryde.

As a preliminary study in the development of the STM, aerial mapping of the Urban Forest was completed. The Urban Forest and its composition was mapped from current aerial photos (2012). These plans show the current extent of the Urban Forest and can be used to:

- Illustrate the extent of Urban Forest in the City.
- Highlight the suburbs and areas within suburbs that are underrepresented.
- Assist in future planning and prioritisation works.
- Assist in future habitat corridor connections.
- Identify residential areas adjacent to bushland.

From this study the following summation of the City's Urban Forest have been made (and as shown on the Urban Forest Distribution Plan):

- A high percentage of trees in the LGA are located in the private domain *(Refer to Figure BG.01 Urban Forest Distribution)*.
- Bushland reserves significantly contributed to the extent of the Urban Forest.
- The number of Urban Forest trees in streets is considerably lower than in the private domain. *(Refer to Figure BG.02 Existing Street Tree Distribution)*

While the City of Ryde *Development Control Plan (DCP) 2010 Part 9.6 Tree Preservatio*n has been an important tool for retaining the Urban Forest cover within the private domain, the enhancement of the Urban Forest in the public domain is Council's primary focus.

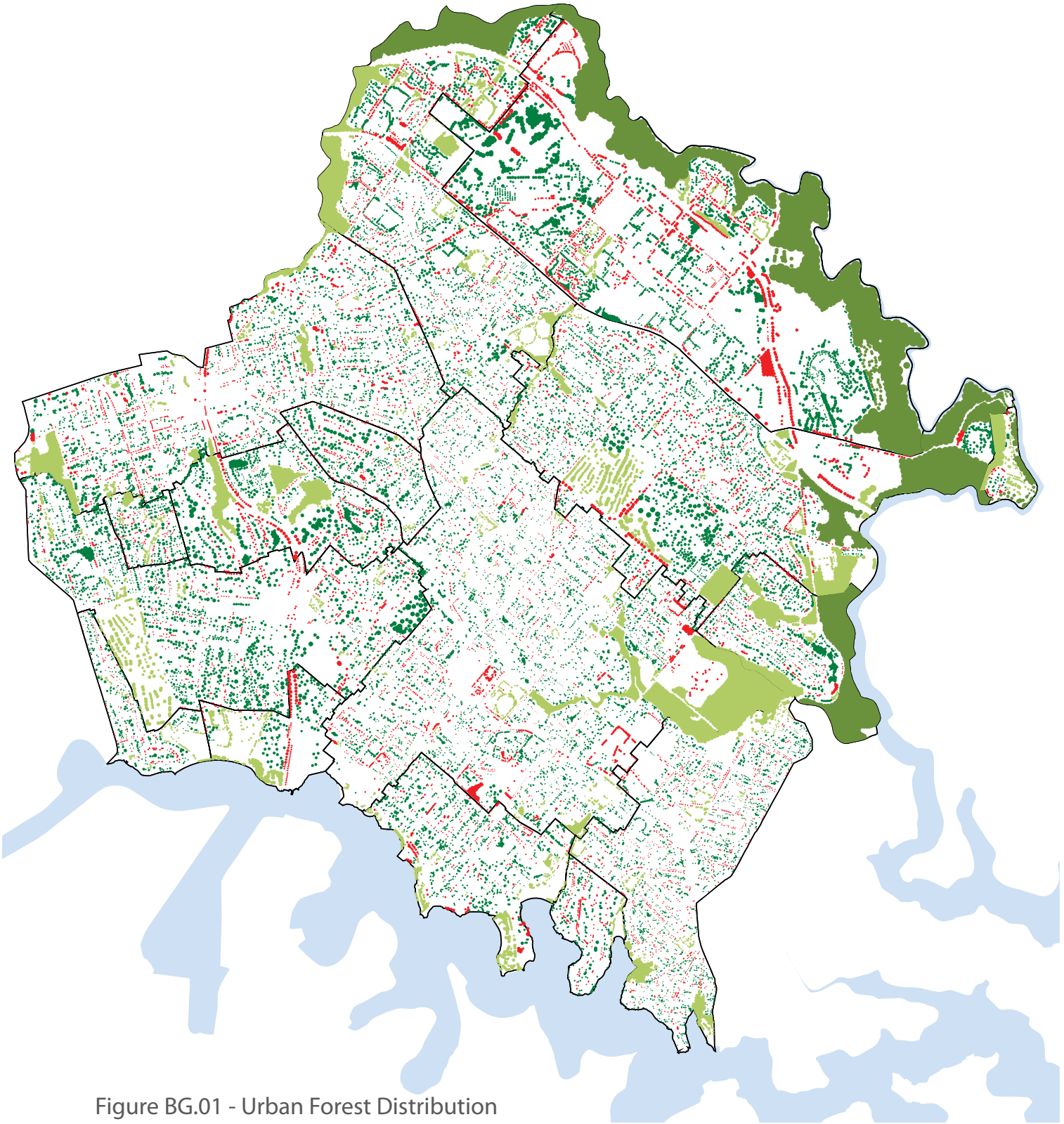


Figure BG.01 - Urban Forest Distribution

Suburb Boundary

City of Ryde Street Trees

Trees located on Private Property

Trees located on City of Ryde Open Space

Trees located in the Land Cove National Park

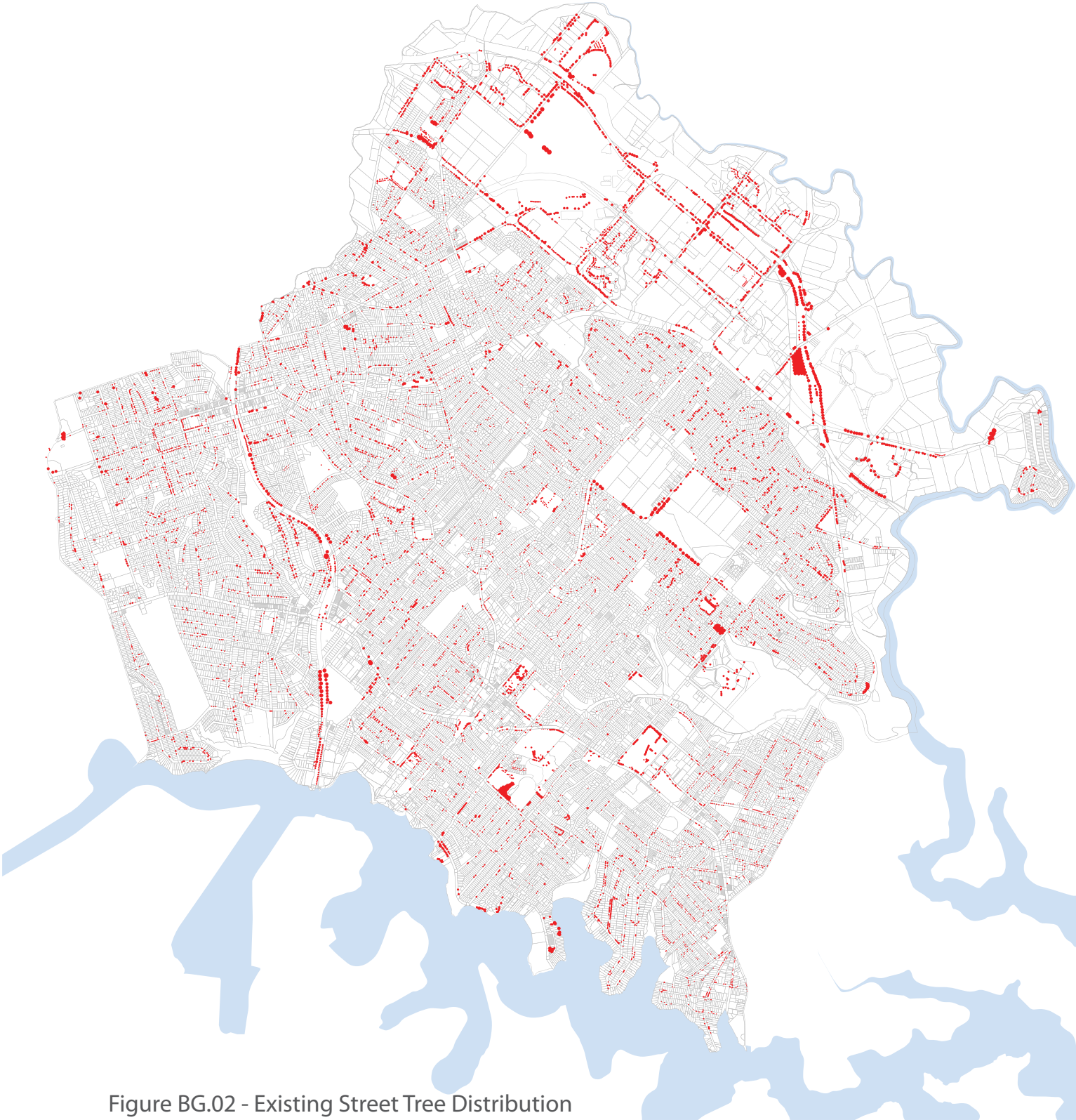


Figure BG.02 - Existing Street Tree Distribution

Legend

Existing street trees

Ryde Geomorphology

Geomorphology is the study of how vegetation and landform are shaped by the underlying rock strata, climate, drainage, water and aspect.

The City of Ryde is comprised of seven natural soil types determined by the underlying bedrock. Together with the topography and aspect, it is the geomorphology that determines the location of the original vegetation types and the growing success of native and exotic species.

It is understood that the top 'A' horizon soil layer in a typical street, particularly older and more urban streets, may not be the original soil type as a result of urban development. The underlying soil profile and rock stratum heavily influences the growth and health of a tree. Native and indigenous tree selections are particularly constrained to their original soil associations. For example *Eucalyptus haemastoma* (Scribbly Gum) is rarely successful beyond Hawkesbury sandstone derived soil types. Shale derived species tend not to perform as well in sandstones and sandstone derived species perform very poorly in the clay/shales. Many exotic species are adaptable to a range of soil conditions and may therefore be more versatile in some instances.

The soil types of City of Ryde are based on the classification from the *'Soil Landscapes of Sydney 1:100,000 series sheets and report' 2009 Ed 4, Department of Environment Climate Change and Water, Sydney.* This is considered the standard of soil classification in the Sydney Region. Accordingly, the City of Ryde is grouped into the following geomorphic types.

Shales and Shale derived Clays

These are reasonably fertile soils that can have poor drainage tendencies. These soils are generally on the ridge tops in the centre and western edge of the City. The majority of the City is on these soils and they were favoured for earlier farming and fruit production.

Sandstones

Soils derived from Hawkesbury Sandstone are typically found lower in the valleys and towards the drainage corridors along the Parramatta and Lane Cove rivers. They also predominate the spurs and ridges to the north and east of the City. These soils generally are sharp draining and have low fertility. They were traditionally avoided for farming and carry a large proportion of the City's remnant bushland.

Transitional Soils

These soils are found in the transition between the shales and clays, usually mid slope between the broad ridges and the valleys. Indigenous species that have adapted to this soil type and can often perform in both sandstones and the shale/ clays.

Alluvium

These are soils found at the bottom of flooded river valleys adjacent to the freshwater creeks and rivers such as the non tidal reaches of the Lane Cove River.

Disturbed Soils

These soil types consist of man made large scale filling of material from other sites, sometimes from beyond the City. These historically occur along the Parramatta River in estuaries that were used to reclaim land for sports fields.

Recent examples of areas of disturbed soils include Macquarie Shopping Centre built over Shrimptons Creek and the Northern Suburbs Cemetery.

Disturbed soils based on the soil maps series do not occur in streetscapes so have not influenced this STM. The planting of street trees in town centres and built up areas rely more heavily on imported mixes. These soils while not classified as disturbed are highly modified.

Figure BG.03 - Soil Types

Scale: 1:45,000

Legend

- Glenorie
- Gymea
- Lucus Heights
- Lane Cove

Disturbed Soils are locatd at Cemery Locations

STREET TREE AUDIT

As part of the development of this STM, an audit of the City's street trees was undertaken. The street tree audit was carried out to give a representative indication of street tree species, health, condition and remaining lifespan that would be used to inform the STM. This has been carried out for Putney, East Ryde, Eastwood and Ryde (as shown in yellow on the figure below).

Figure BG.04 - Area of Tree Audit

- Suburb Boundary
- National Park (NPWS)
- Parks
- Detailed Tree Audit

These areas are archetypal representations of the City and cover the range of conditions found across the City of Ryde. These suburbs cover the following street tree scenarios:

- Town centres and local shopping centres.
- Areas with high rise developments and older residential areas.
- Riverside areas.
- Parks, reserves and national parks.
- Residential areas adjacent to bushland and National Park areas.
- Industrial areas.

Criteria of the tree audit data included:

- A general assessment of the dominant tree species in each street.
- Key data relating to the general street environment.
- Key species growth performance.
- General opportunities and constraints to tree planting.

It is important to note that future detailed auditing of the street trees is essential for pro-active asset management.

Ryde

Ryde has the following characteristics that influence its street trees:

- The suburb of Ryde is on a relatively flat plateau.
- There are few steep grades and consequently few view issues, with some streets having good views to the Sydney city skyline.
- Most of the main arterial roads, such as Victoria Road, Lane Cove Road and Blaxland Road are devoid of street trees.
- The Ryde CBD built around the original old town centre, has a number of narrow streets which are also heavily constrained and devoid of street trees.

- Most of the suburban areas have wide nature strip widths and low street tree numbers. Despite potential for new tree plantings in areas that are not constrained by footpaths, overhead powerlines or view conflicts.
- Most of the houses are fairly modest post war cottages (1950's-1960's) on large blocks of land with generous building setbacks.
- There are pockets of more intensive infill development with wide driveway crossings and consequently a reduction in locations where street trees can be planted.
- Many of the gardens and nature strip trees and shrubs are highly manicured and very few gardens contain large trees.
- The majority of streets contain non-local native and exotic species, limited to about a dozen main species, with an over representation of *Callistemon viminalis* (Weeping Bottlebrush) which is found in nearly every street in Ryde.
- Small ornamental trees are also represented and include: *Tristaniopsis laurina* (Water Gum), *Sapium sebiferum* (Chinese Tallow), *Photinia robusta* (Photinia), *Callistemon salignus* (Willow Bottlebrush), *Lagerstroemia indica* (Crepe Myrtle), *Jacaranda mimosifolia* (Jacaranda), *Nerium oleander* (Oleander), *Hibiscus rosa-sinensis* (Hibiscus), *Robinia pseudoacacia 'Frisia'* (Golden Robinia), *Tibouchina sp.* (Tibouchina), *Callistemon citrinus* (Crimson Bottlebrush) and *Prunus x blireana* (Blireana Plum).
- A large number of street trees appear to have been selected and planted by residents (a large number of these are fruit trees, such as Olive, Mango, Loquat etc).
- Many species are inappropriate to streetscape situations (due to potential size, species), or inappropriate to use beneath powerlines.
- Few streets contain consistent avenue plantings of the same or few species.
- There are very few areas that have a distinctive landscape character.
- Streets that do contain consistent plantings appear to be accepted by the community (consistent avenues of small trees that have been maintained intact for some time).
- Most street trees are immature or semi mature specimens.
- Recent Council plantings of *Angophora costata* (Sydney Red Gum) has been used to very good effect in a small number of trees.

East Ryde

East Ryde has the following characteristics that influence its street trees:

- East Ryde extends out on a ridge line, overlooking surrounding bushland with some of the streets containing locally exotic native species.
- The species planted are consistent to those used in Ryde, but many of the streets contain larger trees and more prolific street planting.
- Many streets have a varied and inconsistent planting palette. Some streets do have street tree planting with a discernible pattern using the same or a small number of species.
- Gardens are still ordered but less manicured and contain larger and a greater number of trees. There is an appreciation of trees, with many remnant trees in the public open space and in private gardens.
- Many of the streets are long and follow the general line of the ridge, following a meandering course rather than a grid like street pattern of the majority of Ryde.

Eastwood

Eastwood has the following characteristics that influence its street trees:

- Remnant avenues of *Lophostemon confertus* (Brushbox) planted before WW2 that have quite a distinctive character.

Eastwood continued

- A small number of streets with deliberate and consistent avenue planting, such as the *Fraxinus griffithii* (Evergreen Ash) in North Road and *Sapium sebiferum* (Chinese Tallow).
- The majority of streets have a variety of species.
- A large number of street trees appear to have been selected and planted by residents, many species are inappropriate to street scape situations.
- In many streets, there are few large trees suggesting a preference for smaller trees.
- The predominant species used is *Callistemon viminalis* (Bottle Brush), it was present in most streets surveyed.
- There are many opportunities resulting from adequate space for tree planting in verges.
- The most common species planted are: T*ristaniopsis laurina* (Water Gum), *Sapium sebiferum* (Chinese Tallow), *Prunus x blireana* (Blireana Plum), *Jacaranda mimosifolia* (Jacaranda), *Callistemon citrinus* (Crimson Bottlebrush), *Callistemon salignus* (Willow Bottlebrush), *Lagerstroemia indica* (Crepe Myrtle) and *Photinia glabra 'Rubeus'* ('Ruben' Photinia).
- The greater majority of trees are young and semi mature which makes management of the Urban Forest easier.
- There are very few streets with any locally indigenous trees used.
- Many of the street trees are shrubs and these have been clipped into neat rounded forms and are reflective of the landscape character of the suburb and residential gardens of the area.
- There are no obvious conflicts between trees and views. Most of the houses are older style single storey dwellings on large allotments with generous setbacks from the street.
- The main roads through the suburb are heavily constrained and there is very little street planting or opportunity for street planting (eg. Blaxland Road and Balaclava Road)
- Some of the streets are heavily constrained by overhead powerlines. In some instances there are powerlines and footpaths on both sides of the street.
- There is greater scope to increase the diversity of species for new street tree planting.

Public street trees are often appropriated by the residents with their own sense of aesthetic. This can be endearing, however the full potential of the tree is not realised.

Putney

Putney has the following characteristics that influence its street trees:

- Most streets have a NE/SW alignment and run downslope toward the Parramatta River, providing some streets and properties with water views.
- There is very little consistency in the street planting and no strong street character provided by street trees. Very few streets have dominant tree planting.
- There are little to no locally indigenous trees with exception of high on the ridge or low along the river in the riparian zone, most of which is public open space.

- The few larger trees that do exist and appear to be successful have elevated open crowns eg. *Corymbia citriodora* (Lemon Scented Gum).
- Overhead powerlines are mainly restricted to one side of the street, and often the footpath has been placed on the opposite side, limiting the potential for street trees. Some streets have footpaths on both sides.
- Significant opportunities exist for replacement planting.
- Planting should be excluded from areas beneath powerlines and targeted at areas where there is adequate nature strip width, community co-operation and using species with elevated open canopies, eg. *Angophora costata* (Sydney Red Gum) to minimise view conflicts.
- There is a need to control inappropriate resident planting.

Summary of Street Tree Audit

The suburbs assessed in the street tree audit process (Putney, East Ryde, Eastwood and Ryde) generally contain low numbers of indigenous tree species as street trees. Many streets contain small exotic or non-local native species, which are often pruned into compact shapes by the adjoining residents.

The street tree population consists of poorly selected species, some of which are inappropriate to the local site constraints (soil, climate), have little amenity value (due to size or position under wires) require high maintenance inputs, have inappropriate form and branching habit, high potential for infrastructure damage and are of little biodiversity value.

An example of the more eclectic and diverse street tree planting within East Ryde.

Street Tree Strategy & Selection

Description of the process employed to determine the most suitable trees for the City of Ryde.

TREE SELECTION MATRIX

"Right tree in the right place" is the guiding principle that has influenced the preparation of the STM. This principle and the establishment of a diverse Urban Forest are critical to the selection of suitable street tree species.

The key to the successful implementation of the STM is species selection and the application of the street tree species across the City.

A detailed species suitability assessment has been formulated to ensure that all streetscapes within the City are planted with the "right tree in the right place" principle.

Value of Street Tree Diversity

In addition to the ecological and aesthetic values of a diverse Urban Forest, the benefits of diversity extend to a reduction in the risk of losing the entire forest in one event, such as through a pest and disease attack or an extreme drought.

A variety of species represents the population of the Victoria Park Urban Forest in Zetland. This project with foresight now has an appreciable amenity of the streets. The different street trees have differing shade qualities, which is desirable for street comfort. This is a good precedent for planning of streetscapes in urban areas.

The City will use street tree planting, in partnership with tree planting in public open spaces to manage the diversity of the Urban Forest through:

- Tree species.
- Ages of trees.
- Growth rates of trees.

By ensuring species selection is informed by these factors the overall vulnerability of the tree population can be reduced. In addition to this, the visual character of the City can be further enhanced with a diversity of species and size.

The Street Tree Species Selection Approach

The City of Ryde will ensure the selection of street tree species will be based on a rigorous process where long term tree performance is the principle objective. Subjective values, such as personal taste, aesthetic and cultural values and perceptions will have minor influence on species selection. However, it is more substantiated factors such as design requirements, ecological considerations, site based constraints and long term longevity that will take precedence.

The City of Ryde Public Domain Manual specifies tree selections for the City's Town Centres and remains the predominate tool for the selection of street trees for town centres.

The species selection approach are founded on the following requirements:

- Long lived species (unless a short living species fast growing was a specific selection requirement).
- Species ability to meet key Urban Forestry criteria, including drought tolerance, heat tolerance, wind tolerance and resistance to pathogens.
- Species should not require excessive remedial maintenance.
- Contribution to ecological goals including

habitat embellishment.

- Considered site analysis to inform species selection to address location opportunities and constraints.
- Considered analysis of context and street character.

These requirements must be satisfied before a tree species will be considered for planting in the streetscapes of the City.

Once these mandatory requirements have been met, street tree species selection is then tested against a second suite of suitability criteria. The following criteria have been established to assist in Council meeting the Urban Forest Policy principles and to guide Ryde's specific site conditions. The criteria is as follows:

- Performance of tree species of varying taxa, provenance, form, structure and size to increase the diversity of Ryde's street tree and park tree population.
- Adaptability of tree species to climate change.
- Suitability for use within the City's street hierarchy, town centres and park edges.
- Tree species that will enable street character, heritage , WSUD and design objectives to be achieved.

Each potential street tree species will be tested against the mandatory requirements and the selection criteria to formulate street tree species lists. The Street Tree Master List is to be updated regularly by council to ensure that species remain appropriate for the City. Appendix 1 contains the current street tree species list.

Triggers for updating the selection criteria and or species list can include:

- Changes in streetscape setting.
- Innovations in planting methodology.
- Developments in tree species and cultivar knowledge and tree performance and research data.

This approach will enable Council to expand the species list to reflect changing conditions within the LGA. Finally, this approach will produce a rigorously scrutinised list of street trees.

Benefits of this Approach

The following discussion provides a summary of the advantages of this approach to street tree species assessment and selection.

Adaptability and Vigour

Adaptable and vigorous street tree species are desirable for the City of Ryde. As site and climatic conditions change, a species list that is flexible will ensure Council can continue to select from a species list that contains adaptable and vigorous street tree species.

Future Flexibility

Street tree management and Urban Forestry is an area of knowledge concept that is still developing, through practical experience and scientific research. As a consequence, the street tree selection process requires ongoing updating as information, data and research become available. Following are some examples of areas that may require updates:

- Tree pathogens in the future may affect a particular selected species. If this is unmanageable then the tree species will be taken off the list. New cultivars and selections that are more disease resistant may be able to be added to the selection list.
- Species that have reduced litter drop are developed. For example, *Olea europaea* (Non Fruiting Olive) and *Melia azedarach* (White Cedar).
- Climate change results in further extremes in weather and the status and suitability of species needs to be updated accordingly.
- Reassess on site conditions such as greater incorporation of 'positive' planting innovations including structural soil beneath porous paving, bio infiltration pits and WSUD basins. These will be integrated with Council's WSUD objectives.

Formal Review

Future opportunity for comprehensive review of the street tree selection requirements and criteria is essential to keep the STM current and appropriate. This formal review is suggested to take place in five years time, 2017. The review will analyse the following aspects:

- Masterplan Strategy Objectives - including prioritisation of work, town centre plans, habitat corridor objectives and replacement species.
- The STM's relationship to the Urban Forest Policy, Environmental Policies Plans of Management, Integrated Open Space Strategy, DCP and other City of Ryde Council policies.
- Changing community perceptions, including any community consultation programme outcomes that will guide prioritisation and locations of tree planting.

STREET TREE SPECIES SELECTION CRITERIA

The base selection criteria for determining the suitability of a street tree for use in the City of Ryde are those that affect its ability to adapt to the street environment.

Acer beurgerianum (Trident Maple) is a very useful street tree much hardier and adaptable than *Ulmus parrifolia* (English Elms). It is a very useful street tree that has proven to be a good performer. Like City of Melbourne this is a good tree species for use in the City of Ryde, particularly in more built up areas and retail centres.

Ten base selection criteria for **adaptability to urban conditions** have been identified. Theses are:

- Drought tolerance
- Heat tolerance
- Wind tolerance
- Longevity
- Pollution tolerance
- Pathogen and pest susceptibility and manageability
- Potential as allergen
- Shade cast
- Maintenance required
- Tree litter

A broad range of species from varied habitats have been tested against these base selection criteria to ensure the best possible tree performance outcome. The species suitability is then tested against given specific individual site conditions and constraints identified across the City of Ryde.

Using the Selection Criteria in Species Selection

Each species' adaptability to urban conditions was awarded an overall numerical score from 1 to 50. This score was derived by assigning a value of one (1) (low) to five (5) (high) for each of the ten (10) base criteria. This adaptability to urban conditions is the sum total of the various plant tolerances that make a particular species or cultivar suited to planting in urban landscapes.

While there is no such thing as the 'perfect street tree', a score of 50 points represents a highly adaptable and useful species. Further review may conclude that this criteria can change. The higher the number of criteria for tree selection the more accurate the scoring.

The STM Master List of Street Trees includes all species that were assessed to be suitable and adaptable to the range of urban conditions and streetscape environments within the City of Ryde.

TREE ADAPTABILITY TO URBAN CONDITIONS

CRITERIA DESCRIPTION	VALUE RATING				
	1	2	3	4	5
Drought Tolerance Drought tolerance is defined as the ability of a species to withstand extended dry periods. Generally plants that require less water (once they are established) are drought tolerant because they are adapted to regions with frequent drought or to soils with low water-holding capacity.	Not tolerant of extended dry periods.	→	→	→	Highly tolerant of extended dry periods.
Heat Tolerance Heat stress can be defined as the rise in temperature beyond a threshold level for a period of time sufficient to cause irreversible damage to plant growth and development. Transitory or constantly high temperatures cause an array of changes to plant growth.	Not tolerant of transitory or constantly high temperatures.	→	→	→	Highly tolerant to high temperatures.
Wind Tolerance Degree to which species/variety is susceptible to limb breakage.	Low tolerance to wind loads and generally resistant to limb breakage.		Moderate tolerance to wind loads and generally resistant to limb breakage.		High tolerance to wind loads and generally resistant to limb breakage.
Longevity Expected life span that a tree species can be retained in a safe and aesthetically pleasing manner in the situation (providing site conditions remain unchanged). Most urban trees have reduced life spans compared to those found in natural habitats.		<2 = Short lived (< 50 years).	Moderate life span (50-100 years).	Moderate to long-lived species (100-150 years).	Long-lived species (> 150 years).
Pollution Tolerance Air pollution is harmful to trees, being absorbed as chemical contaminants as well as dust and particulate matter on the surface of the leaf. The effects of pollutants on trees can cause the tree to weaken and die. The tolerance of species to pollution is largely related to uptake of pollutants by the leaves. Some plants can metabolize pollutants into less toxic substances. Pollution ratings are primarily based on referenced literature and arborist's experience.	Low tolerance of pollution).		Moderately tolerant of pollution.		High tolerance of pollution.

CRITERIA DESCRIPTION	VALUE RATING				
	1	2	3	4	5
Pathogen and Pest Susceptibility and Manageability This rating considers a particular species' susceptibility to pests and pathogens. Major pests currently requiring management input are listed in the Technical Section - Pests and Pathogen Management. Potential pathogens that are currently not present but could impact on species have also been listed.	High susceptibility to pathogens or pests, with control difficult.	→	→	→	Low susceptibility to pathogens and pests, and control easy.
Potential as Allergen (Community Health) The degree of allergic reaction, and the physical origin of the allergen (for instance, sap) known to cause allergic reaction, are indicated on the tree matrix.	High potential as an allergen.	→	→	→	Low potential as an allergen.
Shade Rating This rating represents a qualitative estimate of the degree of shade cast projected by a tree. This rating also considers the form of the tree, for instance a broad tree will cast greater shade compared to a fastigiate tree.	Low shade cast.	Moderate to low shade cast.	Moderate shade cast.	Moderate to high shade cast.	Heavy shade cast.
Maintenance Required This rating assumes typical pruning maintenance works such as pruning for sight clearances, pedestrian access and amenity and clearance of powerlines. Maintenance activities are generally higher in a younger tree in order to attain the form to suit site constraints.	High – Expected maintenance levels are higher than current maintenance standards, representing greater potential impacts with infrastructure or additional seasonal requirements.		Moderate – Typical assumes current cyclic pruning programs to meet site constraints, risk management and legislative requirements.		Low – Due to size or growth habit of the plant the degree of maintenance required would be low.
Tree Litter All trees will shed litter, leaves, bark, flowers or fruit at some time during a given growing season. As far as is possible the tree selections generally do not drop excessive litter. There are exceptions however, such as Magenta Brush Cherry, as these trees have other characteristics which make them suitable for certain planting situations.	Produces a considerable amount of troublesome litter.	→	→	→	Produces little troublesome litter.

Table ST.01 - Tree Adaptability to Urban Conditions

Shade Intensity

1. Low Shade Cast

2. Moderate to Low Shade Cast

3. Moderate Shade Cast

4. Moderate to High Shade Cast

5. Heavy Shade Cast

6. Very Heavy Shade Cast

LOCATION CRITERIA

To ensure successful planting outcomes, detailed analysis of the location for planting is essential.

Considerations that may be used to further refine the selection of a street tree include heritage, biodiversity goals, WSUD goals, aesthetics and character. The STM identifies scenarios for tree suitability that include the following site specific factors:

- Consideration of soil types
- Type of street (street hierarchy)
- Parkland street frontage
- Town centres
- WSUD suitability
- Habitat connection corridor objectives
- Heritage conservation areas
- Suitability for underneath powerlines

These criteria help guide selection of the 'right tree for the right place' principle.

These *Livistona australis* (Cabbage Tree Palm) in West Ryde are thriving as this species is highly adaptable to urban conditions including limited space and compaction once established.

Soil Type

As discussed in the Background Section of the STM, the geomorphology of Ryde is a determinant of street tree suitability. This criteria has been included with in the street tree selection matrix. The suitability is simply qualified as yes (suitable) or no (unsuitable).

Street Types

Consideration of the type of street, dimensions, traffic volume and verge width will have a significant impact on the determination of suitable street tree planting. For the purpose of this plan, the City's streets have been divided into five (5) typologies as listed below.

1. Main roads
2. Feeder streets with a wide verge
3. Feeder streets with a narrow verge
4. Residential streets with a wide verge
5. Residential streets with a narrow verge

The available space for trees in each of the above street typologies will determine the suitability of the tree for its application. Available space for roots and canopy is the most important criteria for selection of the street trees within the tree matrix.

The dimensions of a tree at maturity are important for the physical and visual contribution to the streetscape. Existing constraints within the street (verge widths, extent of pavements, location of underground and overhead services and setbacks to buildings) may limit the size of the tree that can be supported.

It is important the tree does not interfere with pedestrian and vehicular access, services or conflicts with paved surfaces and footings. The optimum size of the tree will be a balance between these elements.

Verge and median widths, building setbacks and proximity of overhead and underground services will influence the selection of appropriate species on a street by street basis. Most streetscape

verges within the City are relatively wide on average for the Sydney region in the older residential areas. Newer areas in the eastern and northern precincts of Ryde are relatively narrow. This will dictate to a large extent the size of street plantings.

In some instances tree planting is inappropriate on narrow or heavily constrained verges. Other options, such as planting within the median or road parking lane are alternative options. There are opportunities particularly in the smaller shopping centres for parking lane planting.

Tree Form, Suitability and Scale

The selected species must have appropriate and predictable growth habit and form, with a single upright trunk (to minimise conflicts with pedestrian and vehicular traffic).

Trees with low spreading branching habit, or those with pendulous foliage or branches are not suitable for use as street trees, due to the need to maintain adequate visibility for traffic and signage. Trees with multiple trunks or known branching defects are not suitable for street planting.

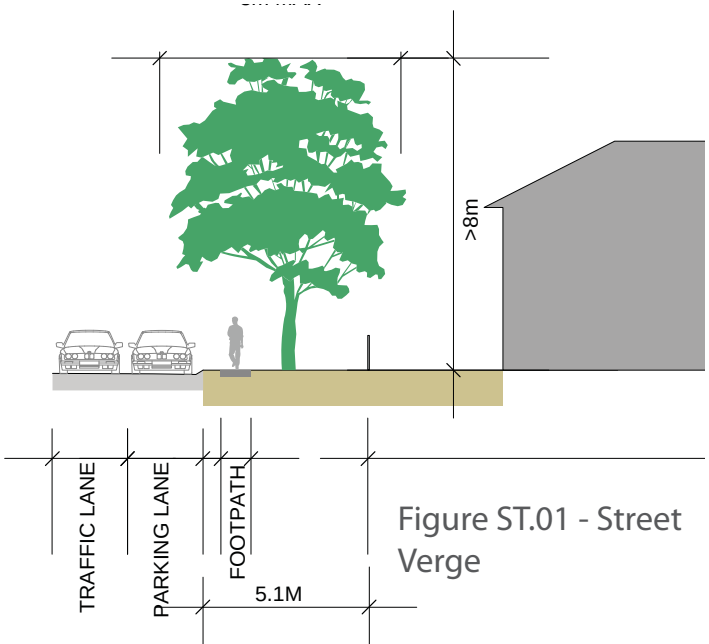


Figure ST.01 - Street Verge

One of the principle criteria in determining street tree suitability for a street environment is the dimensional constraints and available space. Not only is it a matter of having a tree that is not too large for the site, but is it also too small and limiting the potential benefits for the streetscape environment.

Parkland Street Frontages

The City of Ryde has over 190 open spaces and an extensive interface with the Lane Cove National Park. The street frontage of the City's parks has not only identified as being highly significant to the landscape character of the City but offer opportunities for tree planting that will enhance the streetscape.

The planting of open space frontages has been identified as priority in this master plan and consideration should be given to the all opportunities to plant trees in public open spaces.

Town Centres

The City has six (6) town centres that each have a distinct built form and landscape character. This master plan supports the landscape intention for each of these town centres as defined in the relevant public domain manuals and TCP's. The future implementation of the STM will compliment the landscape of the town centres.

WSUD Suitability

Trees that can tolerate wet and dry soils are particularly useful for WSUD applications. Council is developing a WSUD strategy that will include biofiltration in streets as part of the suite of methods for treating stormwater and mitigating flows.

Trees have been selected that are tolerant of the unique and challenging conditions of biofiltration pits and swales.

Habitat Connection Criteria

In the preparation of the STM a review of native plant species and the *Flora and Fauna Studies for Ryde's Bushland Reserves* (as prepared by Biosphere Environmental Consultants (2006, 2007, and 2008) was completed to inform the street tree species list.

In addition to these species, the following ecological objectives developed by Eco-Logical Australia for selection of habitat connection trees includes:

- Nectar producing plants attract a wide range of birds and insects.
- Insect pollinated plants including Acacias, Figs.
- Plant produces succulent fruit that is a known food source for fauna such as birds, the grey-headed flying-fox and possums.
- Encourage trees that produce hollows to provide habitat for micro bat, bird and possum species.
- Autumn/Winter flowering species that provide important source of nectar when there a few other resources, particularly for threatened fauna species such as swift parrot and grey-headed flying-fox.
- Shelter- dense and or prickly foliage providing shelter and nesting habitat for small birds and some protection from opportunistic bird species such as noisy miner and pied currawong.
- Threatened Species Habitat- only considered for the threatened grey-headed flying-fox - includes the fruit of figs and palms and nectar and pollen from Eucalypt, Banksia and Bottlebrush species and the *Syncarpia glomulifera* (Turpentine).
- Rarity- Four levels of conservation significance (threatened, significant in Sydney region, northern Sydney region and locally significant) identified in Kubiak (2005).

Tree Provenance-Selection of Exotic, Native and Locally Indigenous Trees

Urban and suburban areas are highly contrived and very little of the original landscape including soil and water conditions remains. There are exceptions across the City, notably in and adjacent to remnant bush reserves.

Although a plant is indigenous to a site it does not necessarily mean that the current site conditions are optimal for its growth. Urban soils and other conditions are often very different to the conditions in which both indigenous and exotic trees are found in the wild.

The focus should be on tree species adapted to a site and with acceptable characteristics relative to the desired purpose.

A balanced approach for tree selection in the STM has been undertaken and scrutinized. Species are avoided that are identified as weed species or have potential to be future weeds. There are some species that have not been selected because community feedback has determined that a species is problematic or has tendencies that could result in invasion of bushland.

There are exotic species that pose negligible risk for becoming a nuisance or invasive. Many exotic and native species are very useful within the suite of adaptable trees for Ryde's Urban Forest.

Exotic trees also are very suitable in built up areas and town centres because they have shade qualities that change according to season, have good shade density in summer and generally have consistency of form and size.

Trident Maple is a deciduous tree that despite autumn leaf fall has manageable litter drop. Deciduous trees in urban areas can have leaf fall programmed into the street sweeping regime, and being predictable can be planned for in advance. A tree like this has a leaf size less likely to cause blockages compared with London Plane trees.

The Following are a number of principles in determining the suitability of tree provenance:

- Environmental weeds will not be selected.
- Using locally indigenous plant species in the proposed habitat corridors.
- The use of sterile cultivars of very adaptable species may be considered, particularly in highly modified environments.

Remnant, indigenous and native vegetation has an important role to play in urban landscapes. It should be noted, however, that the maturity of existing vegetation is impossible to replace and the diversity of natural plant communities is difficult to replicate.

Preservation of existing natural and remnant vegetation is the most efficient way to incorporate biodiversity in urban landscapes. This is where a Significant Tree Register and City of Ryde DCP (2010) Part 9.6 Tree Preservation planning controls for remnant trees in private land can effectively maintain the existing indigenous tree cover.

Brushbox are a very useful street tree selection for WSUD application as they can tolerate periods of inundation and periods of dryness in biofiltration swales.

Power Lines

Overhead lines may limit the size and/or types of trees grown beneath, due to their branching habit and tolerance to severe pruning. Some planting beneath or adjacent power lines can be considered with attention to the form and branching habit of the selected species.

Limitations in determining the size of the species beneath powerlines may result in one list of suitable trees on one side, where another list of larger species is able to be used on the non powerlines street side. Species used should still be able to have a clear trunk height of two (2) metres for ease of pedestrian access.

TREE PLANTING INITIATORS

Council has undertaken a residential Street Tree Survey that has guided the objectives for the implimentation of street tree planting in the early phases of the STM.

The responses to this survey have determined four (4) main objectives. These include:

- **Community**- where particular groups of resident have shown support for the planting of new street trees in their street.
- **Habitat-** where respondents have supported the idea of habitat trees being planted in their streets that corresponds with the habitat corridoor objectives or connection between open space.
- **Landscape**- where particular aesthetic or streetscape improvements have been identified.
- **Urban**- where town centre upgrades coincide with current street tree planting programmes.

These ‘initiators’ have been identified in more detail in the following Street Tree Precinct plans.

TREE SELECTION MATRIX AS INTERACTIVE TOOL

The Tree Selection Matrix is a flexible tool and able to generate plant lists for all locations and conditions throughout the City of Ryde. The Matrix provides an effective way of organising, sorting and assessing tree species characteristics, tolerances and susceptibilities so as to provide informed and useful tree species selections.

The Matrix is a digital spreadsheet that will allow for future adjustments.

This tool requires the user to determine the characteristics required for tree species within a given environment. It establishes a pattern and consistency for a tree planting programme that enables planning and budget allocation.

Using the Matrix

To understand how to use the Matrix as an interactive tool, these guidelines demonstrate a simple staged process of generating street tree lists for specific locations and or site conditions. The tree selection method will provide tree lists that are flexible to cover different scenarios and constraints such as power lines and verge width.

This results in the creation of a diverse list of street tree species that would be suitable for planting to achieve the master plan aims and objectives.

Street Tree Master Precincts

Identifying the street tree selections for the suburbs in the City of Ryde

STREET TREE PLANTING PRECINCTS

The City of Ryde encompasses a very diverse landscape and urban environment that includes extensive areas of natural bushland, creeks and rivers amalgamated with regionally significant town centres and residential communities of a variety of ages. In consideration of this diversity, the STM has been developed in through a precinct approach.

Eight (8) precincts have been established across the City, informed by the landscape character, topography and urban fabric. While each precinct has a distinct character and has been considered in detail, it also contributes to the overall integrity of the Urban Forest both in and beyond the City boundary.

Consequently each of the precincts have particular objectives and character types that directly influence species selection and planting locations within the STM framework that will direct all street tree planting across the City.

The following eight (8) precinct plans are to be read in conjunction with the Street Tree Selection Matrix to guide species selection while the street typology sections determine street planting locations within each precinct.

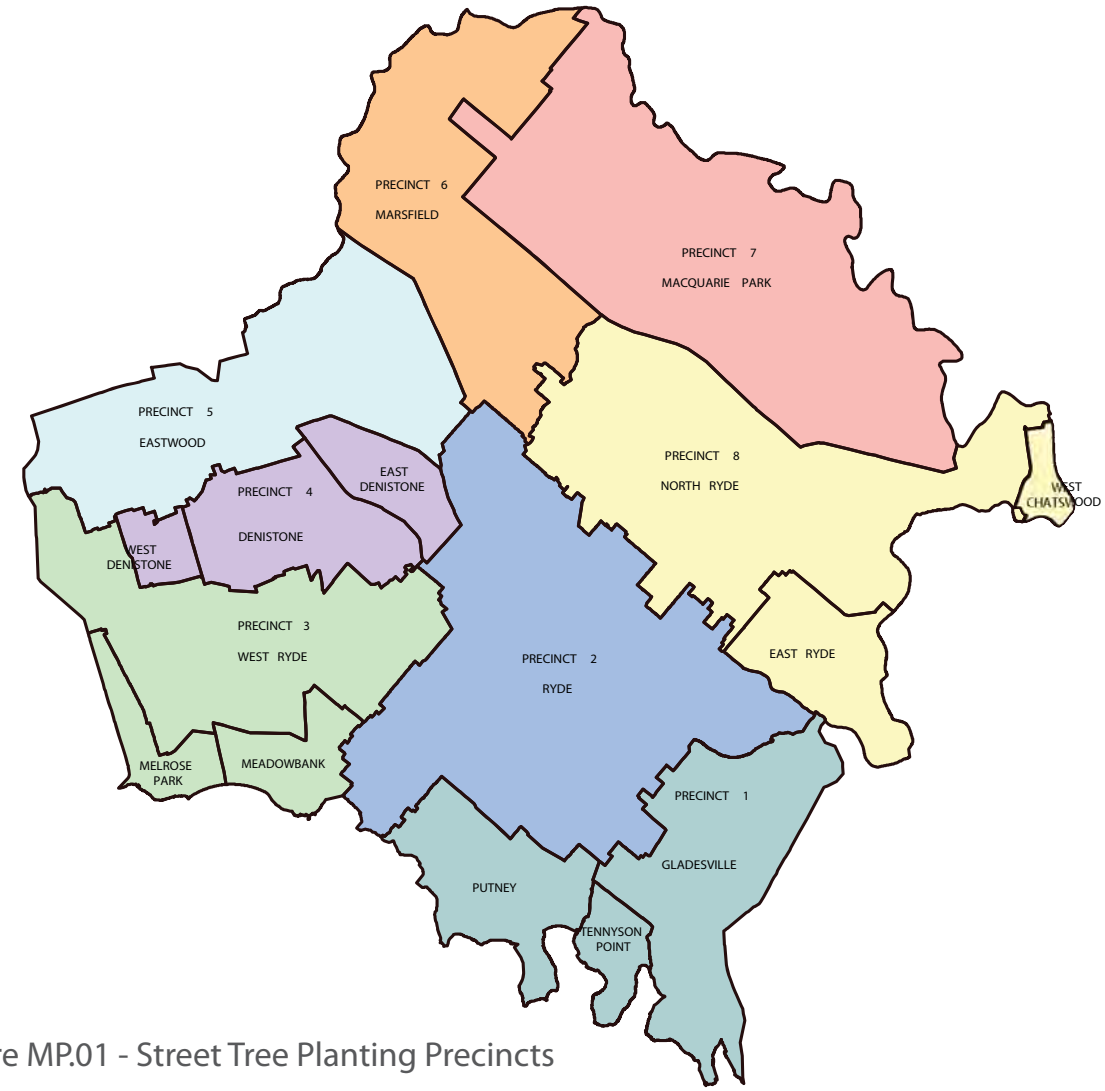


Figure MP.01 - Street Tree Planting Precincts

PRECINCT 1
PUTNEY, GLADESVILLE AND TENNYSON POINT

Existing Streetscape Character

- Residential streets that are under planted.
- Significant long views down the north/south streets towards Parramatta River.
- Significant views along the foreshore.
- Gladesville town centre has restricted tree planting opportunities along Victoria Road.
- Gladesville north of Victoria Road has a reasonable extent of street tree planting.
- Existing constraints include overhead services, views to the Parramatta River and possible low street tree receptiveness closer to the foreshore where there are potential view and tree conflicts.
- There is a very low population of street trees particularly along the foreshore and the south facing slopes leading towards Parramatta River.

North - South streets leading to the Parramatta River have important public views.

Precinct Objectives

- Increase tree planting in the residential streets on the upper slopes of Putney and Gladesville, particularly east west streets.
- Target community consultation at areas with a low street tree population and 'tree receptive' neighbourhoods to determine the effectiveness that a street tree planting programme would have. This would help with prioritising of planning across the City.
- Maintain key public view corridors at Putney Park and Kissing Point Park in balance with habitat connection objectives along the foreshore.
- Select species that allow clear sight lines into public open space.
- Explore opportunities for planting in side streets from Victoria Road at Gladesville.
- Maintain clear public views down Delange Road to the Parramatta River.
- Explore opportunities for new street tree planting along the feeder roads such as Morrison Road, Buffalo Road and Higganbotham Road.
- Explore opportunities for greater coordination of street tree planting as part of the rivers to Rivers corridor.
- Use of locally endemic and suitable native trees in habitat corridors and along the river foreshore.
- Use of natives and exotic trees higher up the slope towards Victoria Road.

City Wide Street Tree Prioritisation

Low priority due to limited community support for tree planting. Further consultation is required to increase community support for street tree planting.

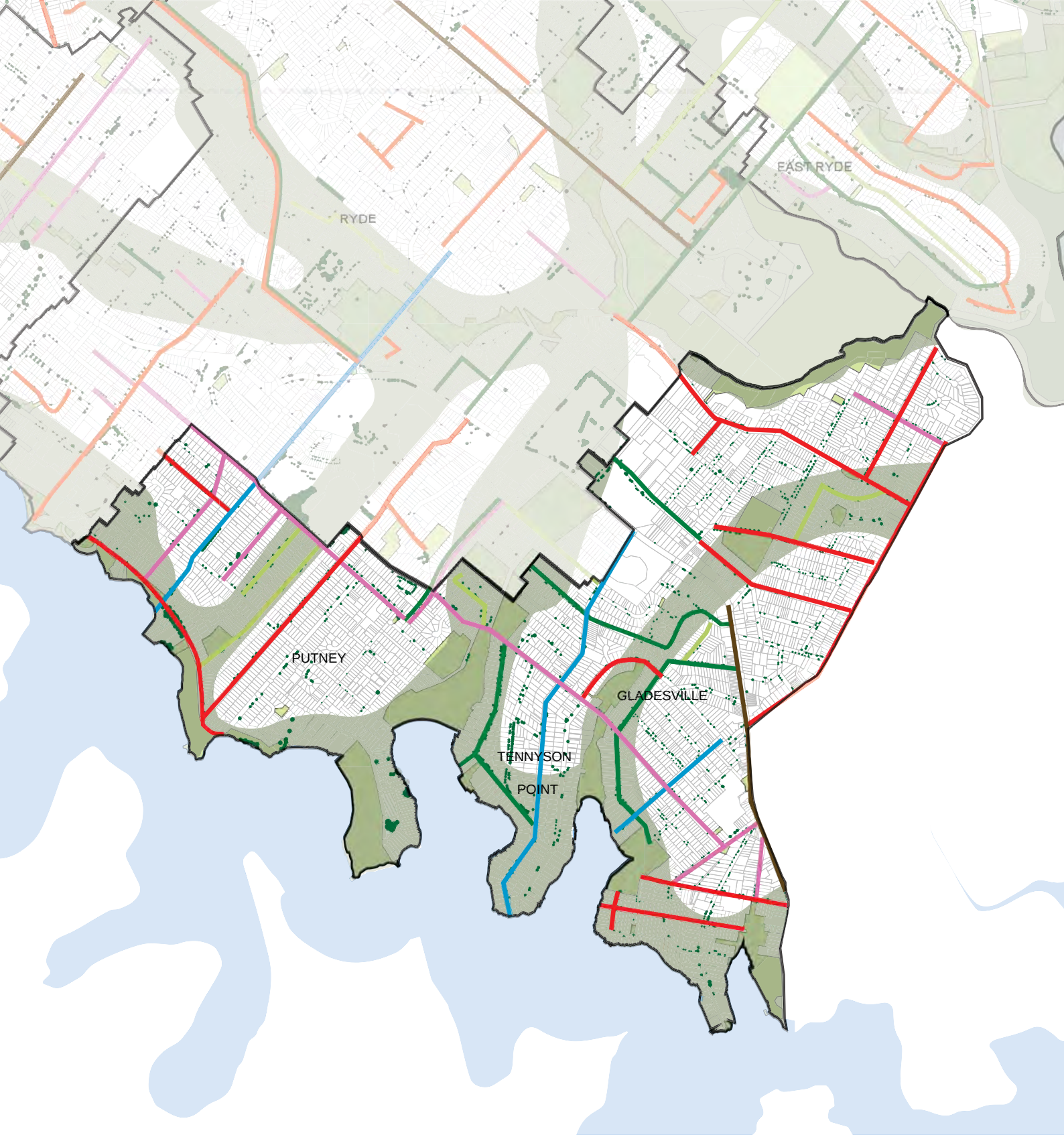


Figure MP.02 - Precinct 1 | Street Tree Master Plan

Legend

- Precinct Boundary
- City of Ryde Open Space
- Parramatta River
- Existing Street Trees
- Habitat Corridor

Planting Initiators

- Community High
- Community Low
- Habitat High
- Habitat Low
- Landscape High
- Urban High

PRECINCT 1 PUTNEY, GLADESVILLE AND TENNYSON POINT ACTION PLAN	
1	Increase street tree planting in streets that have no services constraints or have no obvious issues with views from private properties, focussing on Gladesville.
2	Increase the extent of locally endemic planting in streets adjacent to habitat corridors in the open space corridors of Tennyson Point and Putney.
3	Select species that are suitable to the different soil types and aspects found in this precinct as they vary considerably.
4	Focus street tree planting on areas that will be supported by the community and willing participants.
5	Carefully consider existing views to the water in the public domain to avoid blocking off key public views and creating conflicts or impediments to implementation by Council.

Street Priority Listing

PRIORITY STREETS	INITIATOR	PRIORITY RATING
Small Street, Putney	Community	1
Ashburn Place, Gladesville	Community	1
Pittwater Road, Gladesville	Community	1
Thompson Street, Gladesville	Community	1
Amiens Street, Gladesville	Community	1
Charles Street, Putney	Community	1
Eltham Street, Gladesville	Community	1
Lyndhurst Street, Gladesville	Community	1
Stanbury Street, Gladesville	Community	1
The Strand, Gladesville	Community	1
Waterview Street, Putney	Community	1
Bayview Street, Tennyson Pt	Habitat	1
Warner Street, Gladesville	Habitat	1
York Street, Gladesville	Habitat	1
Beach Street, Tennyson Pt	Habitat	1
Western Crescent, Gladesville	Habitat	1
Osgathorpe Road, Gladesville	Habitat	1
Victoria Road, Gladesville	Urban	1
Tennyson Road, Gladesville	Landscape	1
Princes Street	Landscape	1
Boulton Street, Putney	Community	2
Meriton Street, Gladesville	Community	2
Delmar Parade, Gladesville	Community	2

PRIORITY STREETS	INITIATOR	PRIORITY RATING
High Street, Gladesville	Community	2
Morrison Road, Putney	Community	2
Regent Street, Gladesville	Community	2
Douglas Street, Putney	Habitat	2
Payten Street, Putney	Habitat	2
Evan Street, Gladesville	Habitat	2
Gregory Street, Putney	Habitat	2
Swan Street, Gladesville	Habitat	2
Linley Street, Gladesville	Landscape	2
Ryde Road, Gladesville	Landscape	2
All other streets in Precinct	All	3

Suburb Priority Listing
Low -Tennyson Point and Gladesviile (North)
High- Gladesviile

Table MP.01 - Precinct 1 Tables

PRECINCT 2
RYDE

Existing Streetscape Character

- Strong remnant Blue Gum high forest character through Burrows Park to Field of Mars Reserve.
- A precinct with a number of character types. These include foreshore areas with larger redeveloped houses and low street tree populations, areas of established older neighbourhoods and a good small tree canopy cover (on an LGA wide average) and a character defined by remnant vegetation closer to the Lane Cove River catchment.
- Residential streets with wide verges and with an under representation of street trees.
- Some new successful street tree planting.
- Strong character of exotic trees and natives.
- Some significant trees.
- Existing constraints predominantly overhead services.
- Developing urban centres with opportunity for new street tree plantings.

Precinct Objectives

- Increase tree planting in the residential streets with wide verges and no powerlines.
- Continue street tree planting in Argyle Street and to assist connectivity objectives with Ryde Park and Top Ryde Town Centre.
- Continue use of locally endemic Blue Gum high forest tree species for habitat corridor connections.
- Use of exotic and native rainforest species to reinforce the existing character.
- Ensure adequate and considered street tree planting as part of town centre redevelopment works.
- Explore opportunities for inclusion of WSUD strategy within the town centres.
- Explore opportunities for new street tree planting along the feeder road such as Quarry Road and Blaxland Road.
- Explore opportunities for street tree planting across the street frontage of parks and open spaces.
- Use of locally endemic and suitable native trees in habitat corridors.
- Use of natives and exotic trees beyond the habitat corridors or those for shale soils determined in the tree selection matrix.
- Enhance the quality of local centres such as Midway Town Centre where there are good opportunities for tree planting in the car parking areas and kerb realignments.

City Wide Street Tree Prioritisation

High priority as this is the civic and retail heart of the LGA. Ryde contains many opportunities to increase street tree planting.

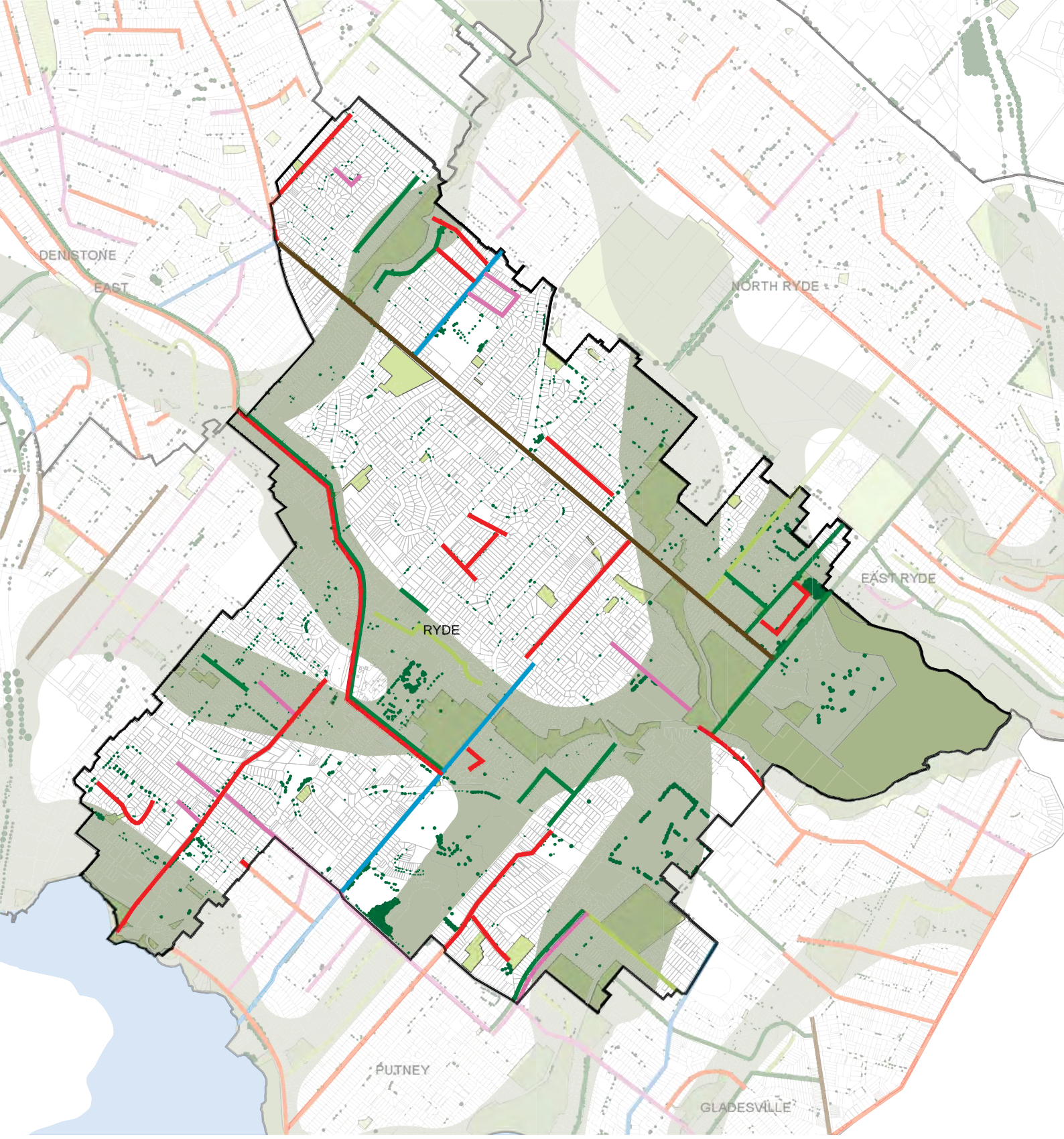


Figure MP.03 - Precinct 2 | Street Tree Master Plan

Legend

- Precinct Boundary
- City of Ryde Open Space
- Parramatta River
- Existing Street Trees
- Habitat Corridor

Planting Initiators

- Community High
- Community Low
- Habitat High
- Habitat Low
- Landscape High
- Urban High

PRECINCT 2 RYDE ACTION PLAN	
1	Increase street tree planting across Ryde within public streets where there are considerable tree planting opportunities. This is a priority within the LGA.
2	Increase the extent of locally endemic planting in streets adjacent to habitat corridors, particularly along the Burrows Park corridor.
3	Increase diversity of tree species across the Ryde precinct, with a focus on the generous verges within residential streets to achieve these objectives.
4	Increase the quantity and scope of formal street tree planting around the Ryde Civic centre and precinct particularly in planning of redevelopment areas.
5	Strengthen the street tree character of the important feeder streets in the Ryde Precinct that connect the other precincts, particularly Quarry and Buffalo Roads.
6	Investigate cultural planting along Princes Rd at Ryde Park.
7	Provide alternatatives to verge planting initiated by residents as part of a formal Council programme

Street Priority Listing

PRIORITY STREETS	INITIATOR	PRIORITY RATING
Cressy Road, East Ryde	Community	1
Henry Street, Ryde	Community	1
Richard Johnson Cres, Ryde	Community	1
Warren Street, Ryde	Community	1
Watts Road, Ryde	Community	1
Addington Avenue, Ryde	Community	1
Belmore Street, Ryde	Community	1
Bruce Street, Ryde	Community	1
Charles Street, Ryde	Community	1
Gardener Avenue, Ryde,	Community	1
Maze Avenue, Ryde	Community	1
Myra Avenue, Ryde,	Community	1
Zola Avenue, Ryde	Community	1
Acacia Avenue, Ryde	Habitat	1
Clayton, Street, Ryde	Habitat	1
Radcliff Street, Ryde	Habitat	1
John Miller Street, Ryde	Habitat	1
Irvine Crescent, Ryde	Habitat	1
Providence Road, Ryde	Habitat	1
Herbert Street, Ryde	Habitat	1
Dorothy Street, Ryde	Habitat	1
Fawcett Street	Habitat	1
Blaxland Road, Ryde	Habitat and Community	1
Frederick Street, Ryde	Habitat and Community	1

PRIORITY STREETS	INITIATOR	PRIORITY RATING
Quarry Road, Ryde	Urban	1
Princes Street, Ryde	Landscape	1
Parkes Street, Ryde	Community	2
Yerong Street, Ryde	Community	2
Christine Avenue, Ryde	Community	2
Adam Street, Ryde,	Community	2
Allan Avenue, Ryde	Community	2
Brian Street, Ryde	Community	2
Thistle Street, Ryde	Community	2
Argyle Street, Ryde	Community	2
Curzon Street, Ryde	Habitat	2
Watt Avenue, Ryde	Habitat	2
Potts Street, Ryde	Habitat	2
Bird Street, Ryde	Habitat	2
Badajoz Road, Ryde	Habitat	2
Forrest Road, Ryde	Habitat and Community	2
Milne Street, Ryde	Habitat and Community	2
Buffalo Road, Ryde	Landscape	2
Smalls Road, Ryde	Landscape	2
Linton Avenue, Ryde	Landscape	
All other streets in Precinct	All	3

Suburb Planting Priority
High

Table MP.02 - Precinct 2 Tables

PRECINCT 3
WEST RYDE, MEADOWBANK AND MELROSE PARK

Existing Streetscape Character

- Street character influenced by the Parramatta River Foreshore and Meadowbank Park, large private land holdings such as TAFE and the golf club.
- Extensive *Lophostemon Confertus* (Brush Box) planting surrounding West Ryde town centre.
- Residential streets with wide verges with an under representation of street trees, particularly in the north of the precinct.
- West Ryde Shopping Centre has recent successful street tree planting.
- Street character that includes exotic trees and natives across the precinct, particularly in West Ryde.
- Existing constraints predominantly overhead services.

Precinct Objectives

- Increase tree planting in the residential streets with wide verges and no powerlines, where there are many tree planting opportunities on good quality native shale soils.
- Maintain a long term strategy of using *Lophostemon Confertus* (Brush Box) in the heritage precincts and where remnant trees occur.
- Priorities the effective management and health of remnant *Lophostemon Confertus* (Brush Box) trees as an important precinct asset and attribute.
- Infill street tree planting around the West Ryde shopping precinct to consolidate the street tree network.
- Use of exotic and native rainforest species to reinforce the existing character.
- Explore opportunities for inclusion of WSUD strategy within the West Ryde Town centre.
- Explore opportunities for new street tree planting along the feeder road such as Chatham Street and Station Street that considers expansion of *Lophostemon Confertus* (Brush Box) plantings as a principle tree.
- Explore opportunities for street tree planting across the street frontage of Meadowbank Park where identified to delineate a stronger edge.
- Trees along park frontages to retain views below the canopy.
- Use of locally endemic and suitable native trees in habitat corridors.
- Heritage *Lophostemon Confertus* (Brush Box) precinct should retain its integrity when proposed to be a part of habitat connection corridors.

City Wide Street Tree Prioritisation

High priority, particularly in the wide verge streets in West Ryde with no power lines.

Figure MP.04 - Precinct 3 | Street Tree Master Plan

Legend

- Precinct Boundary
- City of Ryde Open Space
- Parramatta River
- Existing Street Trees
- Habitat Corridor

Planting Initiators

- Community High
- Community Low
- Habitat High
- Habitat Low
- Landscape High
- Urban High

PRECINCT 3 WEST RYDE,MEADOWBANK AND MELROSE PARK	
1	Maintain the significant Brush Box streetscapes in West Ryde and extend Brush Box planting in the streets surrounding West Ryde town centre.
2	Explore the possibility of planting along the boundary of the golf course to assist with habitat connection corridor objectives.
3	Increase diversity and quantity of tree species across West Ryde as a priority.
4	Prioritise street tree planting in residential streets with wide verges.
5	Prioritise effective management of West Ryde's historic Brush Box avenues.

Street Priority Listing

PRIORITY STREETS	INITIATOR	PRIORITY RATING
Darvall Street, West Ryde	Community	1
Jayne Street, West Ryde	Community	1
Wayella street, Ryde	Community	1
Marsden Road, West Ryde	Community	1
Wattle street, West Ryde	Community	1
Winbourne Street, West Ryde	Habitat	1
Cobram Avenue, West Ryde	Habitat	1
Mons Avenue, West Ryde	Habitat	1
Federal Avenue, West Ryde	Habitat and Community	1
Reserve Street, West Ryde	Habitat and Community	1
Hermitage Road, West Ryde	Urban	1
Adelaide Street, West Ryde	Landscape	1
Falconer street, West Ryde	Community	2
Brush Road, West Ryde	Community	2
Gaza Road, West Ryde,	Community	2
Moira Avenue, West Ryde	Community	2
Murray Street, West Ryde	Community	2
Linton Avenue, West Ryde	Community	2
Farnell Street, West Ryde	Habitat and Community	2
Meadowbank Lance, West Ryde	Habitat	2
Herbert Street, West Ryde	Habitat	2

PRIORITY STREETS	INITIATOR	PRIORITY RATING
West Parade, West Ryde	Urban	2
Rydedale Road, West Ryde	Urban	2
All other streets in Precinct	All	3

Suburb Priority Listing
Medium -West Ryde and Melrose Park
Low - Meadowbank

Table MP.03 - Precinct 3 Tables

PRECINCT 4
DENISTONE WEST & DENISTONE EAST

Existing Character

- Street character influenced by the extent of remnant large Blue Gum High Forest trees.
- Extensive plantings of *Lophostemon Confertus* (Brush Box) in the Denistone heritage precinct adjacent to Darvall Park.
- Residential streets with wide verges and a reasonable street tree representation, mostly comprising verge planting planted by residents.
- The parks and gardens character convey civic pride.
- Existing constraints predominantly overhead services and overshadowing of large remnant trees adjacent to parks and reserves.

Precinct Objectives

- Increase infill tree planting in the residential streets with wide verges and no powerlines.
- Maintain a long term strategy of using *Lophostemon Confertus* (Brush Box) in the heritage precincts and where remnant trees occur.
- Use of exotic and native rainforest species to reinforce the existing character.
- Explore opportunities for new street tree planting along the feeder road such as Blaxland and Chatham Road which can benefit of re-establishing *Lophostemon Confertus* (Brush Box) as a principle tree in Chatham Road.
- Extensive planting along Lovell Road in the verge with no powerlines would create a consistent character with the rest of Denistone.
- Heritage *Lophostemon Confertus* (Brush Box) precinct should retain its integrity as part of habitat connection corridors.

City Wide Street Tree Prioritisation

Low priority as there is a good population of Urban Forest canopy cover of public domain street tree planting. Most planting would be focused on the feeder streets.

Figure MP.05 - Precinct 4 | Street Tree Master Plan

Legend

- Precinct Boundary
- City of Ryde Open Space
- Parramatta River
- Existing Street Trees
- Habitat Corridor

Planting Initiators

- Community High
- Community Low
- Habitat High
- Habitat Low
- Landscape High
- Urban High

PRECINCT 4 DENISTONE, DENISTONE EAST AND DENISTONE WEST.	
1	Maintain the distinct character of Denistone with selection of species appropriate to the Blue Gum High Forest species adjacent to remnant stands and the planting of exotic species.
2	Increase the extent of locally endemic species in the valley areas and adjacent to remnant bushland.
3	Increase diversity and quantity of tree species across Denistone as a priority, particularly with the generally fertile and amenable soils.
4	Prioritise street tree planting in residential streets with wide verges, where infill planting opportunities occur.

Street Priority Listing

PRIORITY STREETS	INITIATOR	PRIORITY RATING
East Parade, Denistone	Community	1
Lund Street, Denistone	Community	1
Marlow Avenue, Denistone	Community	1
Bencoolen Avenue, Denistone	Community	1
Commissioners Road, Denistone	Community	1
Mimos Street, Denistone West	Community	1
Henderson Street, Denistone West,	Community	1
Chatham Road, Denistone West	Habitat	1
Florence Avenue, Denistone	Habitat	1
Elsom Street, Denistone	Habitat	1
Tramway Street, Denistone West	Community	2
Birdwood Street, Denistone East	Community	2
Gordon Cres, Denistone	Community	2
Russell Street, Denistone East	Community	2
Pennant Avenue, Denistone	Habitat	2
Cecil Street, Denistone East Rydedale Road, West Ryde	Landscape Urban	2 2
All other streets in Precinct	All	3

Suburb Priority Listing
Low -Denistone, Denistone East and Denistone West

Table MP.04 - Precinct 4 Tables

PRECINCT 5
EASTWOOD

Existing Streetscape Character

- Town centre planting of smaller *Acer negundo* (Box Elder) in recent streetscape upgrades.
- Rowe Street East and other key town centre streets have very little pedestrian amenity provided by street trees.
- Some good examples of streetscape adjustments to enable recent tree planting in Trelawney Street and Rowe Street West that avoids overhead services.
- Strong representation of exotic small trees in the streetscape and some native street trees, particularly Eucalyptus. Many of these trees have been planted by residents.
- The remnant *Lophostemon Confertus* (Brush Box) 'precinct of Wallace Street and Tarrants and Auld Avenues is a key heritage consideration.
- Is a continuation of the use of *Lophostemon Confertus* (Brush Box) in the adjoining Parramatta City Council area.

Precinct Objectives

- Eastwood town centre future tree planting to connect Eastwood Park and Glenwood Park to the town centre.
- Rowe Street (East) and the eastern town centre is a priority area that could be significantly improved with street tree planting in the parking lanes.
- Street tree planting in Eastwood town centre needs to be diversified from *Acer negundo* (Box Elder), an undesirable species particularly close to reserves and bushland.
- The key feeder streets of Balaclava Road would benefit from changes in footpath alignment to enable tree planting in the narrow verges. Blaxland Road would also benefit from 'gateway' street tree planting.
- The infill planting of *Lophostemon Confertus* (Brush Box) on Tarrants and Auld Avenue and Wallace Street to be considered.
- Rutledge Street between Brush Farm Park and Shaftesbury Road should be considered for replanting of Brushbox consistent with the existing planting character. Planting is to be on one side only.
- Rutledge and First Avenue to receive a uniform gateway planting consistent with the draft Eastwood Town Centre Master Plan.
- Many of Eastwood's parks could benefit from street frontage planting particularly carpark planting along Wingate Avenue to supplement the existing Eucalypts. Graham Avenue at Jim Walsh Park has good opportunities for infill planting of clear trunked trees.
- Many of the residential streets of Eastwood (East) can benefit from extensive street tree planting in the wide verges.

City Wide Street Tree Prioritisation

High priority as there is little street tree planting particularly east of the railway line and Blaxland Road. Focus should be on the verges without powerlines.

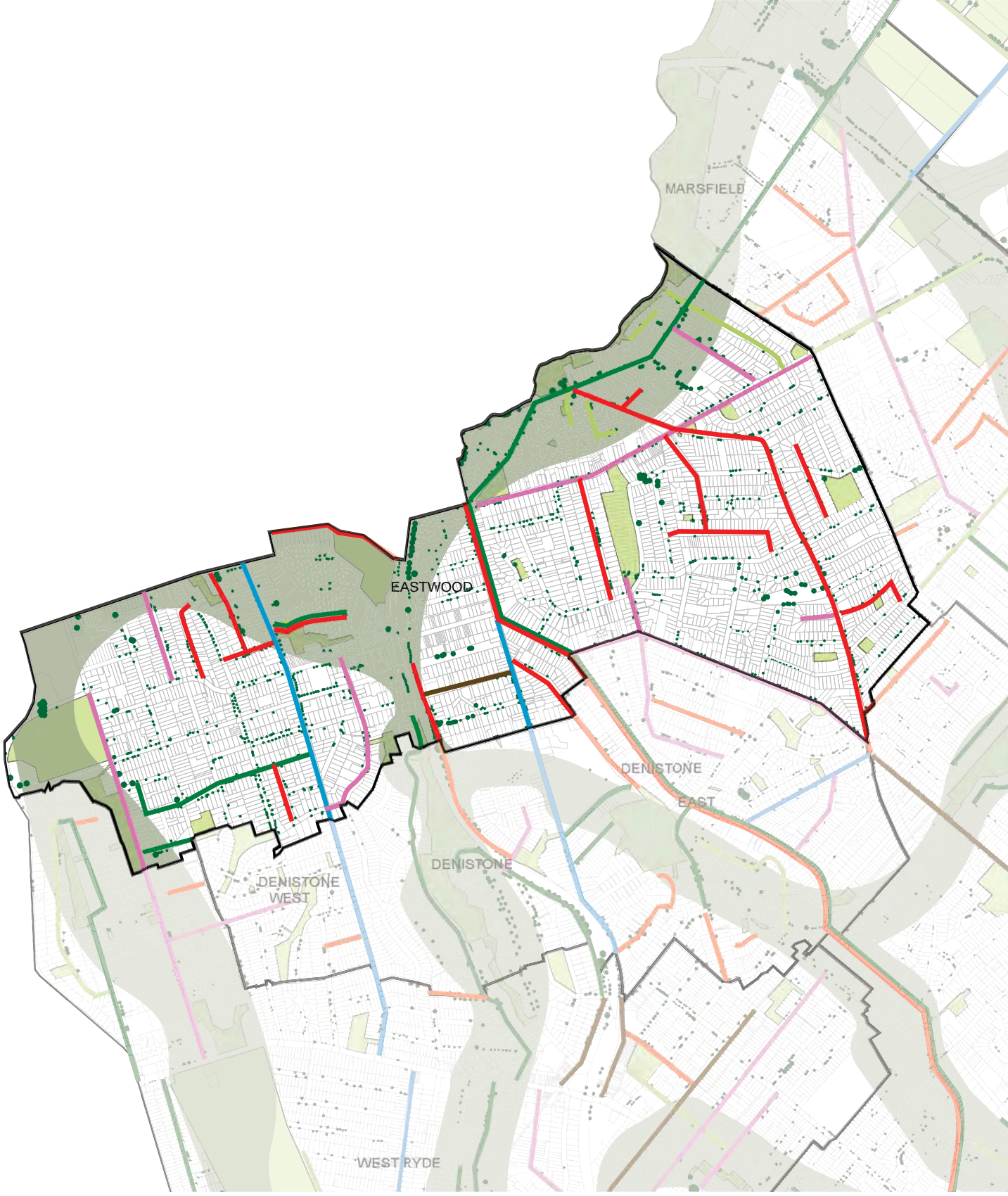


Figure MP.06 - Precinct 5 | Street Tree Master Plan

Legend

- Precinct Boundary
- City of Ryde Open Space
- Parramatta River
- Existing Street Trees
- Habitat Corridor

Planting Initiators

- Community High
- Community Low
- Habitat High
- Habitat Low
- Landscape High
- Urban High

PRECINCT 5 EASTWOOD	
1	Prioritise Eastwood for street tree planting programmes, because of the numerous opportunities in residential streets and town centre upgrade
2	Maintain the character of the Brush Box planting with infill planting and extension of street tree planting of this species.
3	Maintain a management regime for the existing important and historic Brush Box trees in Eastwood.
4	Co-ordinate with draft town centre plan to ensure effective street tree planting
5	Increase park edge planting of Eastwood parks.

Street Priority Listing

PRIORITY STREETS	INITIATOR	PRIORITY RATING
Alexandria Avenue, Eastwood	Community	1
Denistone Road, Eastwood	Community	1
Hunts Avenue, Eastwood	Community	1
Auld Avenue, Eastwood	Community and Habitat	1
Erina Street, Eastwood	Community	1
Glendower Avenue, Eastwood	Community	1
O'Keeffe Cres, Eastwood	Community	1
Richards Avenue, Eastwood	Community	1
Wallace Street, Eastwood	Community	1
Coronation Avenue, Eastwood	Community	1
Ferrabetta Avenue, Eastwood	Community	1
Clan William Street, Eastwood	Habitat	1
Vimera Road, Marsfield	Habitat	1
Glen Street, Eastwood	Habitat	1
Hillview Street, Eastwood	Habitat	1
Rowe Street, Eastwood	Urban and Community	1
Shaftsbury Road, Eastwood	Landscape and Community	1

PRIORITY STREETS	INITIATOR	PRIORITY RATING
Blaxland Road, Eastwood	Landscape	1
Abuklea Road, Eastwood	Landscape	
Trelawney Street, Eastwood	Community	2
Vera Street, Eastwood	Community	2
Lovell Road, Eastwood	Community	2
Terry Road, Eastwood	Community	2
Pickford Avenue, Eastwood	Community	2
Harrison Avenue, Eastwood	Community	2
Lincoln Street, Eastwood	Habitat and Community	2
Clive Road, Eastwood	Community	2
Raymond Street, Eastwood	Habitat	2
All other streets in Precinct	All	3

Suburb Priority Listing
High -Eastwood

Table MP.05 - Precinct 5 Tables

PRECINCT 6
MARSFIELD

Existing Streetscape Character

- A mixed character of street trees influenced by the changes in soil type from shale to sandstone closer to the Lane Cove River catchment.
- Mixed exotics and natives are used south of Epping Road however street tree representation is low.
- Street tree planting closer to Waterloo Road and the M2 is heavily planted with native Eucalypts from within the private domain adjacent to the street frontage.
- Recent native tree planting (1970's and 1980's) is overcrowded and too sporadic in many instances.

Precinct Objectives

- Vimiera Road and Balaclava Road should maintain a consistent tree planting in the narrow verge feeder.
- Herring Road has excellent opportunities for large street tree planting in the wide verges that do not have powerlines.
- Focus on residential street tree planting east of Balaclava Road, where there are extensive planting opportunities.
- Marsfield Park will require street frontage planting to replace the *Cinnamomum camphora* (Camphor Laurel) on Culloden Road.
- More consistent street tree planting at Trafalgar Shopping Centre.
- Explore greater tree planting opportunities in Tarranto Road and other streets of Marsfield North with underground services.
- Tree planting of native and indigenous rainforest species adaptable to sandstone soils to create better shade amenity in Marsfield north, eg. Busaco Road.

City Wide Street Tree Prioritisation

High priority east of Balaclava Road, low west and north of Balaclava Road.

Figure MP.07 - Precinct 6 | Street Tree Master Plan

Legend

- Precinct Boundary
- City of Ryde Open Space
- Parramatta River
- Existing Street Trees
- Habitat Corridor

Planting Initiators

- Community High
- Community Low
- Habitat High
- Habitat Low
- Landscape High
- Urban High

PRECINCT 6 MARSFIELD	
1	Prioritise street tree planting where there is no overshadowing from established trees within the private domain, opportunities are in the southern half of this precinct.
2	Increase diversity of tree planting to the north and west of Balaclava Road.
3	Create a stronger uniformity of street tree planting along the feeder roads through Marsfield. In particular Balaclava, Vimiera,Waterloo and Herring Roads.
4	Replace large native Eucalypts such as Tallowoods with locally endemic trees where space allows.
5	Consolidate park edge planting in Marsfield Park and coordinate with the Integrated Open Space Strategy.
6	Use smaller native species in the north of the precinct that can adapt to growing under large Eucalypts, such as Acacias and other smaller endemic species.

Street Priority Listing

PRIORITY STREETS	INITIATOR	PRIORITY RATING
Abuklea Road, Marsfield	Community	1
Cooper Street, Marsfield	Community	1
Croyte Place, Marsfield	Community	1
Sobaraon Road, Marsfield	Community	1
Torrington Drive, Marsfield	Community	1
Yangall Road, Marsfield	Community	1
Culladen Road, Marsfield	Community and Habitat	1
Cook Street, Marsfield	Habitat	1
Kent Road, Marsfield	Habitat	1
Lucinda Street, Marsfield	Habitat	1
Culloden Road (North), Marsfield	Landscape	1
Agincourt Road, Marsfield	Community	2
Balaclava Road, Marsfield	Community and Habitat	2
Taranto Road, Marsfield	Habitat	2
Busaco Road, Marsfield	Habitat	2
Waterloo Road, Marsfield	Habitat	2
All other streets in Precinct	All	3

Suburb Priority Listing
Low -Marsfield (north)
Medium -Marsfield (south)

Table MP.06 - Precinct 6 Tables

PRECINCT 7
MACQUARIE PARK

Existing Streetscape Character

- Existing character of large Eucalypts planted as part of the business park and light industry development in the 1970's and 1980's.
- Does not retain the pre 1950's character of the rest of the Ryde LGA.
- Large representation of the 'Forestry NSW' species such as *Eucalyptus microcorys*, *E. scoparia* and *E. nicholii*.
- Macquarie University and the Shopping Centre predominate the landscape to the west. Macquarie University has a very strong private domain 'forest' of large native trees, principally Eucalypts.
- The Urban Forest canopy is represented dominantly in the private domain and within institutions.
- There are unique opportunities in Macquarie Park with planted road medians and wide verges.
- Many services are underground.
- Some large existing trees are starting to senesce through disease or pathogens such as *Eucalyptus nicholii* and *E. scoparia*.

Precinct Objectives

- Enhance the Urban Forest within the public domain streetscapes plantings.
- Expand the scope of habitat corridor endemic species through the whole of Macquarie Park and supplemented with native species, particularly suitable rainforest species to provide an aesthetic balance and diversity to the Eucalypts.
- The use of endemic trees species representing Sydney Sandstone Gully Forest and Sydney Sandstone Ridge top woodland.
- Exotic deciduous trees will not suit the character of the streets in this precinct.
- Explore opportunities on unbuilt streetscapes making WSUD biofiltration pits and swales mandatory where water quality objectives can be realised.
- Street trees need to respond to the scale of the new developments and block sizes.
- Refer to the Macquarie Park Public Domain Technical Manual. Utilise the expanded tree selections available in the STM.
- Feeder roads such as Talavera and Waterloo Roads should have a consistent and uniform tree planting approach.

City Wide Street Tree Prioritisation

New developments should have street tree planting as a compulsory condition of development application. Tree protection measures for existing established trees are important in redevelopment work. New street tree planting initiated by Council is low on an LGA wide scale.

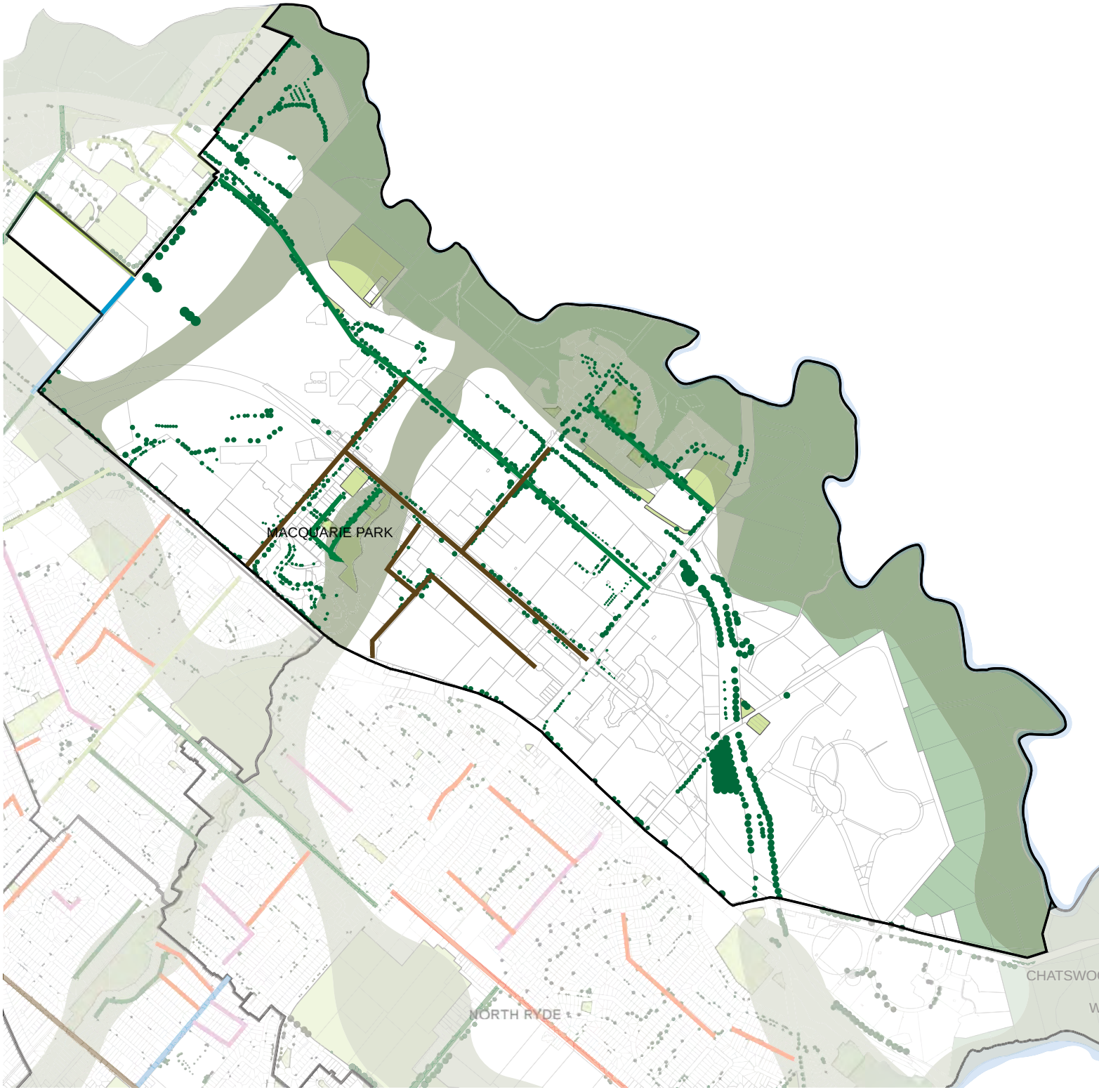


Figure MP.08 - Precinct 7 | Street Tree Master Plan

Legend

- Precinct Boundary
- City of Ryde Open Space
- Parramatta River
- Existing Street Trees
- Habitat Corridor

Planting Initiators

- Community High
- Community Low
- Habitat High
- Habitat Low
- Landscape High
- Urban High

PRECINCT 7 MACQUARIE PARK	
1	Take advantage of new development to expand current practice tree planting methodology and incorporation of WSUD.
2	Take advantage of trialling a variety of street tree species, particularly in median strips.
3	Review the Macquarie Park Street Master Plan to explore additional options for street tree implementation.
4	Avoid the use of exotic deciduous trees that do not suit the character of Macquarie Park.
5	Co-ordinate with the Environment and Planning the development of new streetscapes.

Street Priority Listing

PRIORITY STREETS	INITIATOR	PRIORITY RATING
Fontenoy Road, Macquarie Park	Habitat	1
Byfield Street, Macquarie Park	Urban	1
GIffnock Avenue, Macquarie Park	Urban	1
Herring Road, Macquarie Park	Urban	1
Kahartoum Road, Macquarie Park	Urban	1
Lyon Park Road, Macquarie Park	Urban	1
Talavera Road, Macquarie Park	Urban	1
All other streets in Precinct	All	3

Suburb Priority Listing
High- Macquarie Park

Table MP.07 - Precinct 7 Tables

PRECINCT 8
NORTH RYDE, EAST RYDE & CHATSWOOD WEST

Existing Streetscape Character

- North Ryde has extensive areas of verges with low quantities of street tree planting.
- Occasional large Eucalypts in streets planted by residents.
- East Ryde has a character defined by scattered remnant endemic trees, particularly beyond the sandstone transition zone.
- Chatswood West has a distinctive character which is dominated by large remnant trees in the valley and towards the Lane Cove National Park.
- The local shopping centres are very successful and yet street tree planting has not been a key part of street upgrades.
- The Urban Forest canopy is represented dominantly in the private domain particularly in the heavily vegetated areas in the east of the precinct.
- The Shrimptons Creek corridor has a strong character of remnant Blue Gum High Forest and Blackbutts south of Waterloo Road.

Precinct Objectives

- Rebalance the Urban Forest representation within the public domain streetscapes particularly in North Ryde where there are tree planting opportunities.
- Expand the scope of habitat corridor endemic species through the east of the precinct and on the larger creek corridors such as Shrimptons Creek. This is to be integrated with future habitat corridor projects and the Integrated Open Space Strategy.
- Exotic trees will not suit the character of the eastern half of the precinct. Prioritise the use of endemic trees, particularly those suited to transitional and sandstone soils.
- A greater diversity of exotic tree species and native trees will be suitable in North Ryde.
- Feeder roads are to have a consistent and uniform tree planting approach. Roads to target include Waterloo, Talavera, Wicks and Herring Roads. Only plant on verges without powerlines as a priority.

LGA Wide Street Tree Prioritisation

High Priority for street tree planting in North Ryde.

Low priority in East Ryde.

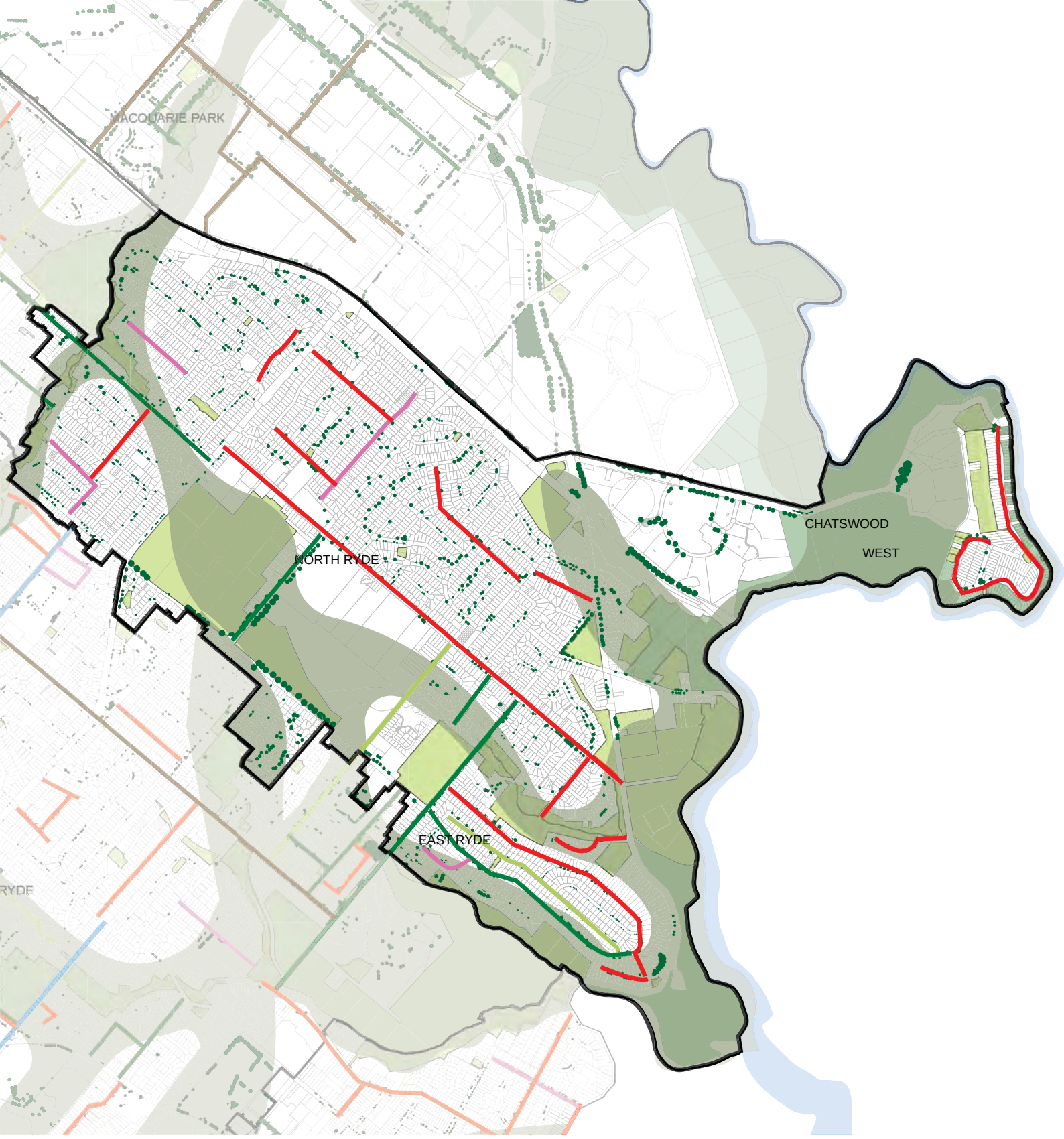


Figure MP.09 - Precinct 8 | Street Tree Master Plan

Legend

- Precinct Boundary
- City of Ryde Open Space
- Parramatta River
- Existing Street Trees
- Habitat Corridor

Planting Initiators

- Community High
- Community Low
- Habitat High
- Habitat Low
- Landscape High
- Urban High

PRECINCT 8 NORTH & EAST RYDE AND CHATSWOOD WEST	
1	Expand tree planting programmes in North Ryde where there are considerable street tree planting opportunities in residential streets.
2	Expand existing Council street tree planting beyond recently completed works.
3	Extend street tree planting at Coxs Road shopping centre. Explore opportunities for kerb geometry alignment.
4	Create uniform street tree planting along key feeder streets such as Wicks and Coxs Road.

Street Priority Listing

PRIORITY STREETS	INITIATOR	PRIORITY RATING
Ada Street, North Ryde	Community	1
Brohill Avenue, East Ryde	Community	1
Coxs Road, North Ryde	Community	1
Edmondson Street, North Ryde	Community	1
Lorna Street, North Ryde	Community	1
MacCallum Avenue, North Ryde	Community	1
Marilyn Street, North Ryde	Community	1
Melba Drive, East Ryde	Community	1
Napier Crescent, North Ryde	Community	1
River Avenue, Chatswood West	Community	1
Warwick Street, North Ryde	Community	1
Wolfe Road, East Ryde	Community	1
Cressy Road, North Ryde	Community and Habitat	1
Badajoz Road, North Ryde	Habitat	1
Hartford Street, North Ryde	Habitat	1
Moncriff Drive, North Ryde	Habitat	1
Wicks Road, North Ryde	Habitat	1
Avon Road, North Ryde	Community	2
Cilento Cres, East Ryde	Community	2
Cook Street, North Ryde	Community	2
Michael Street, North Ryde	Community	2
Elliott Avenue, North Ryde	Habitat	2

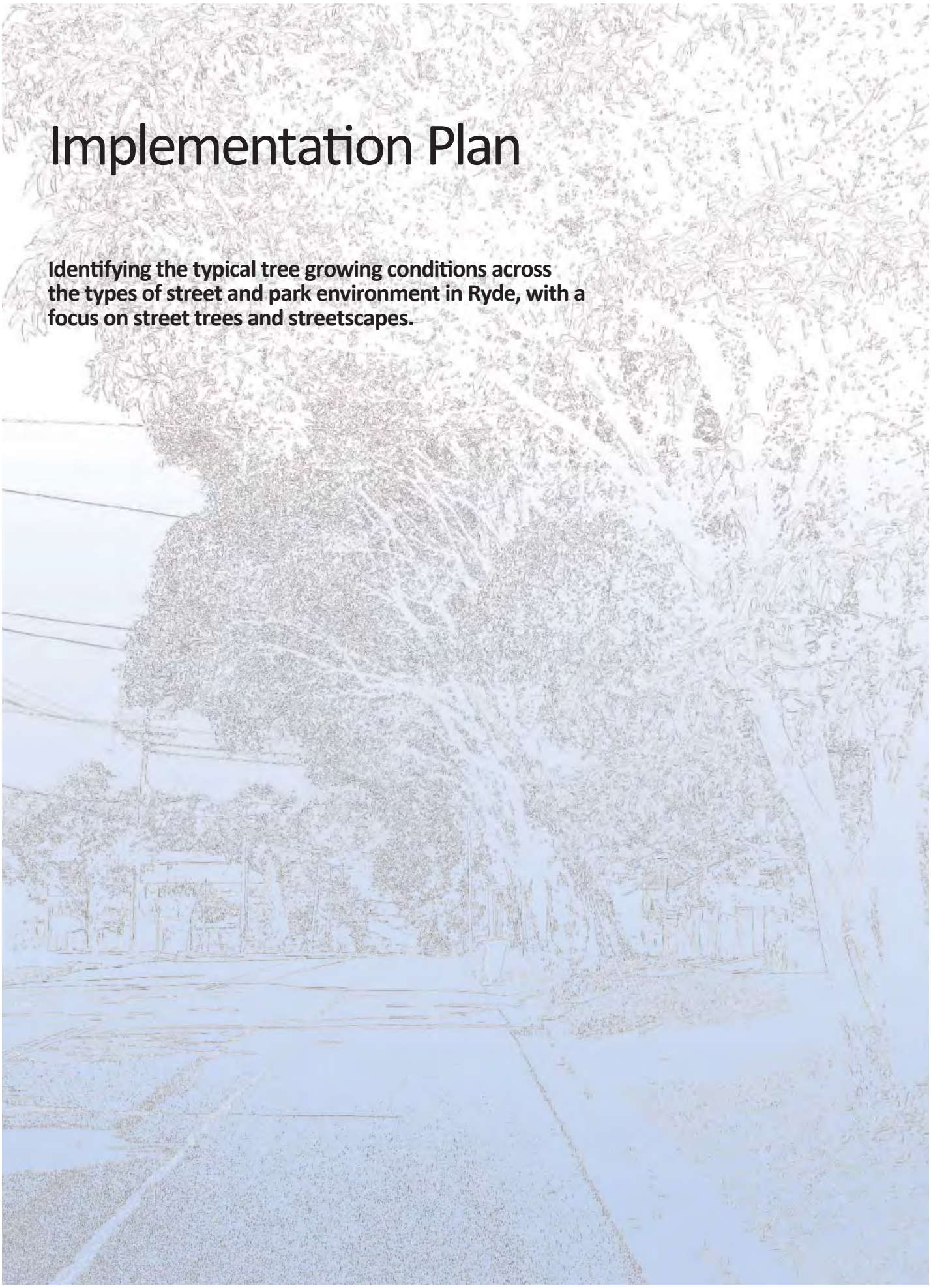
PRIORITY STREETS	INITIATOR	PRIORITY RATING
All other streets in Precinct	All	3

Suburb Priority Listing
High- Macquarie Park

Table MP.08 - Precinct 8 Tables

Implementation Plan

Identifying the typical tree growing conditions across the types of street and park environment in Ryde, with a focus on street trees and streetscapes.



IMPLEMENTATION OF THE MASTER PLAN

Priority Areas for Street Tree Planting

Street tree planting across the City is uneven and has been predominantly unplanned. As identified in the previous Section, there are clear focus areas for future planting where Council can gain the most effective results with budgets and physical street planting opportunities.

The streets with the **best opportunities** have the following characteristics:

- Wide turfed verges with adequate soil volume
- Relatively gentle slopes for easier maintenance and infiltration of surface water
- Few overhanging large trees from the private domain that will overshadow or compete establishing trees for water and nutrients
- Limited overhead services
- Footpaths one side of the verge, to provide a constraint free verge opposite
- Areas where residents are pro actively street tree receptive and have approached Council for increased street tree planting (as identified in the 2012 Street Tree Survey)

Consideration has been given to the long term success of all new street tree planting and as a component of the preparation of the STMP, a survey was conducted to determine community responsiveness to tree planting. This survey, in addition to habitat, urban and landscape determinants have informed the priority areas for street tree planting.

The precinct approach to the STMP has assisted in identifying those precincts across the City that are a higher priority for future street tree planting.

Priority Levels

The STMP identifies three priority ranking levels for the future street tree planting across the City.

- Level 1 - Short range planting program (1-10 years)
- Level 2- Medium range planting program (11- 20 Years)
- Level 3 - Long range planting program (21 years onwards)

Level 1 Priority Street Tree Planting Areas

Level 1 Priority Precincts (short range planting program 1-10 years)

The high priority precincts for future street tree planting include:

- Ryde
- Eastwood
- Macquarie Park
- North Ryde

Level 1 Priority Street (short range planting program 1-10 years)

As listed in each of the precinct plans, all streets within each precinct have been assigned a rating of 1, 2 or 3, with a 1 assigned to those streets that have the highest of priority.

The Level 1 streets are listed below. These street represent those that were identified in the community survey as having clear support from the community for tree planting.

List of Level 1 Priority Streets

The following streets have been identified as having the highest level of priority for future street tree planting.

Initiators:

C Community
H Habitat
L Landscape
U Urban

PRECINCT	PRIORITY STREETS	INITIATOR
Denistone	Bencoolen Avenue, Denistone	C
Denistone	Commissioners Road, Denistone	C
Denistone	East Parade, Denistone	C
Denistone	Henderson Street, Denistone West,	C
Denistone	Lund Street, Denistone	C
Denistone	Marlow Avenue, Denistone	C
Denistone	Mimos Street, Denistone West	C
Denistone	Chatham Road, Denistone West	H
Denistone	Elsom Street, Denistone	H
Denistone	Florence Avenue, Denistone	H
Eastwood	Alexandria Avenue, Eastwood	C
Eastwood	Coronation Avenue, Eastwood	C
Eastwood	Denistone Road, Eastwood	C
Eastwood	Erina Street, Eastwood	C
Eastwood	Ferrabetta Avenue, Eastwood	C
Eastwood	Glendower Avenue, Eastwood	C
Eastwood	Hunts Avenue, Eastwood	C
Eastwood	O'Keeffe Cres, Eastwood	C
Eastwood	Richards Avenue, Eastwood	C
Eastwood	Wallace Street, Eastwood	C
Eastwood	Auld Avenue, Eastwood	C H
Eastwood	Clan William Street, Eastwood	H
Eastwood	Glen Street, Eastwood	H
Eastwood	Hillview Street, Eastwood	H
Eastwood	Vimera Road, Marsfield	H
Eastwood	Blaxland Road, Eastwood	L
Eastwood	Shaftsbury Road, Eastwood	L C
Eastwood	Rowe Street, Eastwood	U
Macquarie Park	Fontenoy Road, Macquarie Park	H
Macquarie Park	Byfield Street, Macquarie Park	U
Macquarie Park	Giffnock Avenue, Macquarie Park	U
Macquarie Park	Herring Road, Macquarie Park	U
Macquarie Park	Khartoum Road, Macquarie Park	U
Macquarie Park	Lyon Park Road, Macquarie Park	U
Macquarie Park	Talavera Road, Macquarie Park	U
Marsfield	Abuklea Road, Marsfield	C
Marsfield	Cooper Street, Marsfield	C
Marsfield	Croyte Place, Marsfield	C

PRECINCT	PRIORITY STREETS	INITIATOR
Marsfield	Sobaraon Road, Marsfield	C
Marsfield	Torrington Drive, Marsfield	C
Marsfield	Yangall Road, Marsfield	C
Marsfield	Culladen Road, Marsfield	C H
Marsfield	Cook Street, Marsfield	H
Marsfield	Kent Road, Marsfield	H
Marsfield	Lucinda Street, Marsfield	H
Marsfield	Culloden Road (North), Marsfield	L
North Ryde	Ada Street, North Ryde	C
North Ryde	Brohill Avenue, East Ryde	C
North Ryde	Coxs Road, North Ryde	C
North Ryde	Edmondson Street, North Ryde	C
North Ryde	Lorna Street, North Ryde	C
North Ryde	MacCallum Avenue, North Ryde	C
North Ryde	Marilyn Street, North Ryde	C
North Ryde	Melba Drive, East Ryde	C
North Ryde	Napier Crescent, North Ryde	C
North Ryde	River Avenue, Chatswood West	C
North Ryde	Warwick Street, North Ryde	C
North Ryde	Wolfe Road, East Ryde	C
North Ryde	Cressy Road, North Ryde	C H
North Ryde	Badajoz Road, North Ryde	H
North Ryde	Hartford Street, North Ryde	H
North Ryde	Moncrieff Drive, North Ryde	H
North Ryde	Wicks Road, North Ryde	H
Putney	Amiens Street, Gladesville	C
Putney	Ashburn Place, Gladesville	C
Putney	Charles Street, Putney	C
Putney	Eltham Street, Gladesville	C
Putney	Lyndhurst Street, Gladesville	C
Putney	Pittwater Road, Gladesville	C
Putney	Small Street, Putney	C
Putney	Stanbury Street, Gladesville	C
Putney	The Strand, Gladesville	C
Putney	Thompson Street, Gladesville	C
Putney	Waterview Street, Putney	C
Putney	Bayview Street, Tennyson Pt	H
Putney	Beach Street, Tennyson Pt	H
Putney	Osgathorpe Road, Gladesville	H
Putney	Warner Street, Gladesville	H
Putney	Western Crescent, Gladesville	H
Putney	York Street, Gladesville	H
Putney	Princes Street	L
Putney	Tennyson Road, Gladesville	L
Putney	Victoria Road, Gladesville	U
Ryde	Addington Avenue, Ryde	C
Ryde	Belmore Street, Ryde	C
Ryde	Bruce Street, Ryde	C
Ryde	Charles Street, Ryde	C
Ryde	Cressy Road, East Ryde	C
Ryde	Gardener Avenue, Ryde,	C
Ryde	Henry Street, Ryde	C
Ryde	Maze Avenue, Ryde	C
Ryde	Myra Avenue, Ryde,	C
Ryde	Richard Johnson Cres, Ryde	C
Ryde	Warren Street, Ryde	C
Ryde	Watts Road, Ryde	C
Ryde	Zola Avenue, Ryde	C
Ryde	Acacia Avenue, Ryde	H
Ryde	Clayton, Street, Ryde	H
Ryde	Dorothy Street, Ryde	H
Ryde	Fawcett Street	H
Ryde	Herbert Street, Ryde	H
Ryde	Irvine Crescent, Ryde	H
Ryde	John Miller Street, Ryde	H
Ryde	Providence Road, Ryde	H
Ryde	Radcliff Street, Ryde	H
Ryde	Blaxland Road, Ryde	H C
Ryde	Frederick Street, Ryde	H C
Ryde	Princes Street, Ryde	L
Ryde	Quarry Road, Ryde	U
West Ryde	Darvall Street, West Ryde	C
West Ryde	Jayne Street, West Ryde	C
West Ryde	Marsden Road, West Ryde	C
West Ryde	Wattle street, West Ryde	C
West Ryde	Wayella street, Ryde	C
West Ryde	Cobram Avenue, West Ryde	H
West Ryde	Mons Avenue, West Ryde	H
West Ryde	Winbourne Street, West Ryde	H
West Ryde	Federal Avenue, West Ryde	H C
West Ryde	Reserve Street, West Ryde	H C
West Ryde	Adelaide Street, West Ryde	L
West Ryde	Hermitage Road, West Ryde	U

Table MI.01 - Level 1 Priority Streets

Level 2 Priority Street Tree Planting Areas

Level 2 Priority Precincts (medium range planting programmes 11-20 years)

These areas have opportunities for planting, however are not a high priority. This is due to patchy street tree planting (although some trees are present) and a number of specimens planted by residents. There are also considerable services restraints. These precincts include:

- Putney
- Marsfield
- West Ryde

Level 2 Priority Street (medium range planting, programmes 11- 20 years)

These streets represent those that were identified in the community survey as having support from the community for tree planting. The Level 2 streets are listed below.

List of Level 2 Priority Streets

The following streets have been identified as having the highest level of priority for future street tree planting.

Initiators:

C Community
H Habitat
L Landscape
U Urban

PRECINCT	PRIORITY STREETS	INITIATOR
Denistone	Birdwood Street, Denistone East	C
Denistone	Gordon Cres, Denistone	C
Denistone	Russell Street, Denistone East	C
Denistone	Tramway Street, Denistone West	C
Denistone	Pennant Avenue, Denistone	H
Denistone	Cecil Street, Denistone East	L
Denistone	Rydedale Road, West Ryde	U
Eastwood	Clive Road, Eastwood	C
Eastwood	Harrison Avenue, Eastwood	C
Eastwood	Lovell Road, Eastwood	C
Eastwood	Pickford Avenue, Eastwood	C
Eastwood	Terry Road, Eastwood	C
Eastwood	Trelawney Street, Eastwood	C
Eastwood	Vera Street, Eastwood	C
Eastwood	Raymond Street, Eastwood	H
Eastwood	Lincoln Street, Eastwood	H C
Marsfield	Agincourt Road, Marsfield	C
Marsfield	Balaclava Road, Marsfield	C H
Marsfield	Taranto Road, Marsfield	H
Marsfield	Busaco Road, Marsfield	H
Marsfield	Waterloo Road, Marsfield	H
North Ryde	Avon Road, North Ryde	C
North Ryde	Cilento Cres, East Ryde	C
North Ryde	Cook Street, North Ryde	C
North Ryde	Michael Street, North Ryde	C
North Ryde	Elliott Avenue, North Ryde	H
Putney	Boulton Street, Putney	C
Putney	Delmar Parade, Gladesville	C
Putney	High Street, Gladesville	C
Putney	Meriton Street, Gladesville	C
Putney	Morrison Road, Putney	C
Putney	Regent Street, Gladesville	C
Putney	Douglas Street, Putney	H
Putney	Evan Street, Gladesville	H
Putney	Gregory Street, Putney	H
Putney	Payten Street, Putney	H
Putney	Swan Street, Gladesville	H
Putney	Linley Street, Gladesville	L
Putney	Ryde Road, Gladesville	L
Ryde	Adam Street, Ryde,	C
Ryde	Allan Avenue, Ryde	C
Ryde	Argyle Street, Ryde	C
Ryde	Brian Street, Ryde	C
Ryde	Christine Avenue, Ryde	C
Ryde	Parkes Street, Ryde	C
Ryde	Thistle Street, Ryde	C
Ryde	Yerong Street, Ryde	C
Ryde	Badajoz Road, Ryde	H
Ryde	Bird Street, Ryde	H
Ryde	Curzon Street, Ryde	H
Ryde	Potts Street, Ryde	H
Ryde	Watt Avenue, Ryde	H
Ryde	Forrest Road, Ryde	H C
Ryde	Milne Street, Ryde	H C

PRECINCT	PRIORITY STREETS	INITIATOR
Ryde	Buffalo Road, Ryde	L
Ryde	Smalls Road, Ryde	L
West Ryde	Brush Road, West Ryde	C
West Ryde	Falconer street, West Ryde	C
West Ryde	Gaza Road, West Ryde,	C
West Ryde	Linton Avenue, West Ryde	C
West Ryde	Moira Avenue, West Ryde	C
West Ryde	Murray Street, West Ryde	C
West Ryde	Herbert Street, West Ryde	H
West Ryde	Meadowbank Lance, West Ryde	H
West Ryde	Farnell Street, West Ryde	H C
West Ryde	Rydedale Road, West Ryde	U
West Ryde	West Parade, West Ryde	U

Table MI.02 - Level 2 Priority Streets

Level 3 Priority Street Tree Planting Areas

Level 3 Priority Precincts (low range planting programmes 21+ years)

There are precincts that have a reasonable street tree planting that would not be a high priority in establishing Urban Forest cover. They have been classified as a low or longer term priority for planting. This includes the following suburbs:

- Denistone, Denistone East and Denistone West
- Gladesville (north of Victoria Road)
- Marsfield (North)

There are still many opportunities for in-fill planting within these suburbs. Sound Urban Forestry management would also include planning for tree succession needs to be allowed.

Level 3 Priority Street (low range planting programmes 21+ years)

All streets not listed as a Level 1 or Level 2 priority are Level 3 priority streets.

OTHER CONSIDERATIONS FOR PROGRAMMING OF STREET TREE PLANTING

The following suburbs have constraints such as large remnant or planted trees in the private domain that overhang the public domain. These trees can limit the establishment of new trees because of competition for moisture and light. These include:

- East Ryde (below the ridge line)
- West Chatswood
- Marsfield
- Macquarie Park (around the University)

Views, particularly views to the water from both the private and public domain are a constraint to successful street tree planting. Planting in these areas should be carefully planned and positioned to minimise impacts in public and private views. Many of the Parramatta River side suburbs are subject to this constraint. This includes:

- Putney
- Tennyson Point
- Meadowbank
- Melrose Park

These suburbs traditionally had very few street trees. The aerial photos from 1943 depict this as one of the most heavily cleared and treeless parts of the City.

The neighbourhood and local shopping centres are another area that would prove worthwhile as a priority planting area. This masterplan discusses how with some minor street geometry adjustments the quality and amenity of these streetscapes could be significantly improved. Locating street trees adjacent to shopping centres would bring a high number of people into contact with an improved street environment.

STREET TREE PLANNING

Tree Succession

Trees planted around the same time, suffer equal pressures from increasing urbanisation around them and start to decline and senesce about the same time.

Replacing aged trees, particularly those that make a significant contribution to the amenity and heritage values of a street challenge in Urban Forestry.

The following principles apply to succession and replacement of trees:

- Replacement of individual trees does not achieve long term Urban Forestry management goals.
- Planting of individual trees is discouraged because growing conditions for new trees amongst large old trees is difficult due to competition for light and space.
- Staged removal and replacement of 'blocks' of trees is preferred, so that the visual impact of the loss of a large stand of trees could be staged over a reasonable time frame, reducing the initial visual impact.
- Ensure block replacement is preceded by public consultation and support as well as long term planning and the political will to carry it out.
- Replacement planting with the same (or alternative species) where sufficient space exists and there is the ability to undertake planting in rows or blocks.
- Replacement planting can be undertaken in streets devoid of trees as an offset to removal of trees in other areas, where replacement planting cannot be undertaken instantaneously.

Inappropriate Tree Planting

Inappropriate tree planting is sometimes undertaken on public land by local residents. As Council is ultimately responsible for these plantings it must reserve the right to remove any inappropriate plantings, especially those that do not comply with the tree selection criteria and may result in potential nuisance, hazards or other problems in the short or long term.

Information should be provided to residents to prevent inappropriate plantings. Notification should be carried out prior to the removal of any unauthorised plantings, explaining the reasons for the actions being taken.

The City of Ryde have some street tree species that are now considered undesirable weed species. The extent of *Cinnamomum camphora* (Camphor Laurels) in Ryde is not as great as in other areas such as Hunters Hill and Ku-ring -gai. The removal of 'grand old trees' conflicts with heritage perceptions and is an ongoing challenge for the City. *Cinnamomum camphora* (Camphor Laurels) were planted extensively early last century as a very useful and adaptable shade tree. It has been recommended that these trees be incrementally replaced with a more suitable species such as *Syzigium sp.* or *Ficus sp.* before they become hazardous.

Street Tree Size

Where possible, Council should plant larger street trees that will provide benefits to the community.

A single, strategically located large street tree has a bigger impact on conserving energy and mitigating the urban heat island effect than a corresponding quantity of smaller trees. Larger trees do more to:

- Reduce stormwater run off.
- Extend the life of street surfaces.
- Improve local air, soil and water quality.
- Reduce atmospheric carbon dioxide.
- Provide wildlife habitat.
- Increase property values.
- Enhance the attractiveness of an area.
- Promote human health and well being.

The bigger the tree, the larger the benefits and ultimately, the better the community's quality of life.

Streetscape geometry and off-street parking

Increasingly across the City there is increased demand for both off-street and on-street car parking facilities, particularly in town centres and adjacent to recreation facilities. Site planning associated with new development should take into account any existing street trees and avoid encroachments of new pavements into Tree Protection Zones.

Retrofitting of parallel and angled or perpendicular parking bays can result in significant damage to the root systems of trees, leading to accelerated decline and reduction in useful life. Construction of vehicle cross overs results in a similar impact.

Angled and 90 Degree Car Parking

Many of the City's on street car park areas have not been designed for inter-planting with trees. These can, however, easily be retrofitted to enable tree planting within the parking lane. Parking bays that are too deep can enable street tree planting at an extended kerb edge. There are a number of strategies and opportunities to facilitate parking within the public domain as well as enable trees to coexist or create opportunities for tree planting.

There is also the potential for porous pavements to enable off-street parking to be formalised and reduce erosion, while still enabling a soil root volume for adjacent large trees.

Much of the car parking in Ryde is parallel parking, though there are some shopping centres with 90 degree parking. With a more efficient parking layout it is possible to include new tree planting areas. With the use of porous pavements in parking spaces, trees can utilise the volume of soil beneath the tree spaces. Space can also be provided between cars for pedestrian circulation at strategic points in the streetscape, such as opposite street corners.

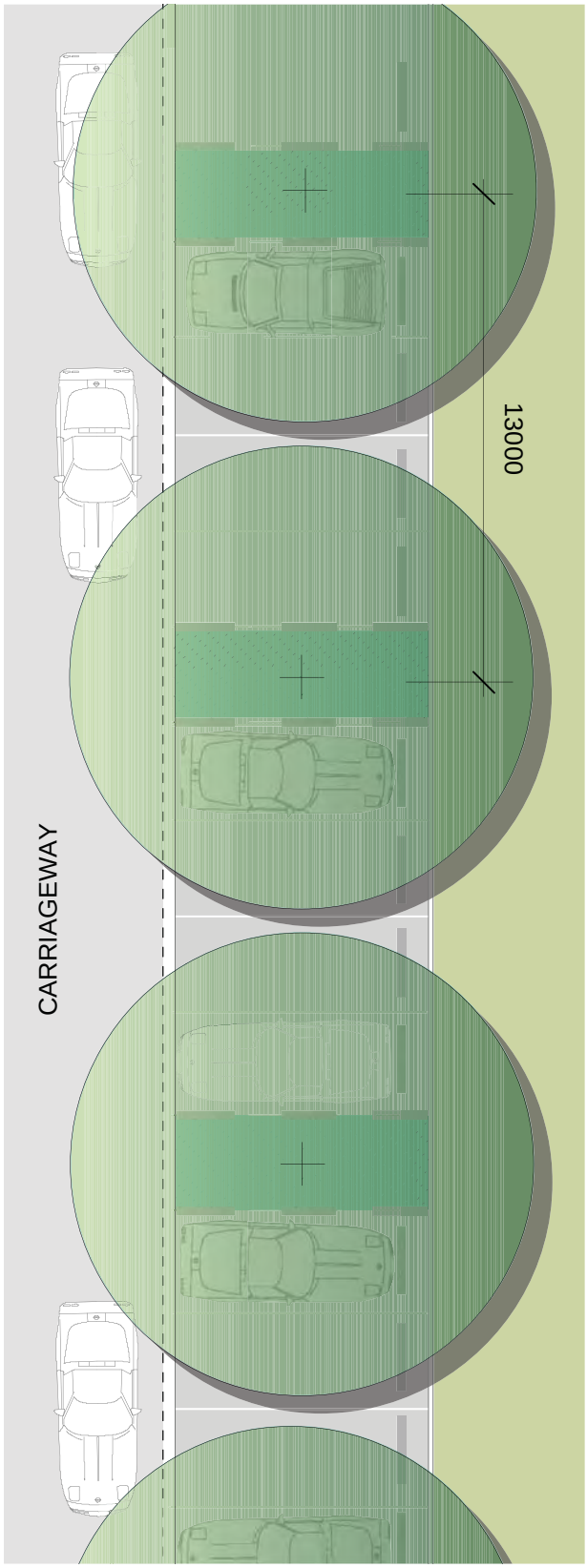


Figure MI.01 - 90 Degree Parking

90 degree parking showing tree planting pit minimum 2 metres wide and flanked by porous paving on structural soil. A large tree of 13 metres canopy size can have touching canopies with the next trees and four car spaces between trees.

Midway Shopping Centre in Ryde is one example of the many local shopping centres that could easily be retrofitted for street tree enhancement. Minor kerb realignments and hit and miss tree hole planting can be used to enhance the amenity of already successful and well loved local shopping centres.

Street Verges

The City of Ryde has many wide planting verges for street tree planting. These verge widths are particularly important to allow enough soil rooting volume particularly in more urban areas where there are greater challenges to successful tree growth. While there are extensive areas of overhead power lines that limit the use of large trees there are opportunities to grow large trees on the opposite verge.

The average street width in Ryde is approximately 3.6 metres at a minimum. Most streets regardless of size, including main roads, feeder streets and residential streets, have street tree planting opportunities. Verges exceeding three metres are the most useful for street tree planting.

Appropriate space needs to be provided to allow for tree canopy and roots structure. This will:

- Avoid damage to tree roots.
- Result in healthier trees that live longer.
- Reduce maintenance costs and also the potential for trees to become hazardous.
- The width of the street verge generally determines the tree's health. Trees in wider verges are generally healthier than trees in narrow verges.

Following is the classification of verge types used in street tree selection matrix.

Narrow Verges < 3.6 metres

- These trees have sufficient space for trees only if there are no overhead services.
- There is sufficient space for trees to grow and for services allocation on opposite sides of the street.
- A tree that is required to attain a clear stem of approximately 2000mm will also not have a canopy width that allows for a building facade potentially at the property boundary.
- Narrow lanes may not suit tree planting as part of the streetscape character.
- Often there are also overhanging trees from the private domain that can compete with new trees.
- If the road carriageway is wider than required, there may be opportunities in the parking lane or in kerb extensions and islands at street corners.

Wide Verges > 3.6 metres

- These streets will have space for a tree planting verge.
- The majority of streets are in this category.
- For streets greater than a verge width of 3.6 metres the footpath would ideally be at 1600mm.
- It is best practice for footpaths to be a porous pavement over structural soil to minimise the lifting of pavement by street tree roots.
- The balance of turf to planting in a verge is determined by cost, maintenance regime and capacity and the degree of 'permeability' that a street needs to have - to allow sufficient crossing points at the verge.
- A tree hole with a minimum width of 800mm in a 2 metre wide footpath increasing to 2 metres in a 3.6 metre wide verge. The tree hole defines the edge of the pedestrian clear path of travel.
- A tree with a greater canopy size can shade the footpath / streetscape and provide a valuable role in creating a livable street.
- The canopy size should also be relative to the scale and width of the street, the hierarchy of the street and scale of adjacent buildings.

Parking Lanes and Medians

- Can provide opportunities for large soil volumes.
- Provides opportunities for passive irrigation and WSUD. Ideally these planting are set down 100mm from the road to allow WSUD goals to be incorporated.
- Passive irrigation, where tree holes can access low overland flows are increasingly important in a changing climate.
- Trees in the parking lanes can help with traffic calming by reducing the perceived carriageway width.
- Most services are in the footpaths and not the roads.
- Tree canopy can shade the footpath and the road carriageway helping achieve canopy cover objectives for shading the streets.
- Trees can often coexist with power lines in the verge, assuming the correct tree is selected to reduce maintenance.
- Tree root barriers may be necessary in the carriageway side of a parking lane tree pit, avoid using them elsewhere.
- Tree holes should define the car parking bay, 2.5 metres for parallel parking and approximately 6 metres for 90 degree parking. The tree hole should be a minimum of 2.5 metres square with the parking lane ideally being porous to allow trees to reach the require size to attain streetscape design objectives.

Verges in New Development Areas (Macquarie Park and Urban Infill)

- Take advantage of no overhead services, by planting larger trees.
- Create a coherent streetscape character and amenity by increasing street tree planting and in the public domain generally.
- New inlet kerb and gutter for street tree pits and other WSUD devices for future developments to ensure that trees can be sustainably watered through passive irrigation.
- Utilise the street parking lanes for tree planting.
- Utilise shared ducts and utilities trenches.

Shared Services Trenches

Use of shared ducts and services trenches for communications and electrical services should be considered as a priority. This is a cost effective practice for sites that were previously undeveloped. In existing urban areas the relocation of utilities comes at an extra cost but the benefits go far beyond trees. The use of shared services trenches greatly eases future utilities servicing and minimises the upheaval of roads.

STREET HIERARCHY IMPLEMENTATION

The street geometries of the Ryde LGA vary due to the organic growth of the various suburbs since European settlement. As with many of the suburbs of the north shore of Sydney, topography, the original land use, geomorphology, transport connections and different ideas in development and planning have shaped the alignment and width of streets.

Street geometry influences the street tree selection opportunities and the streetscape character. The available space for trees in the street will be the principle species selection criteria. The street types vary from:

- Fractured surveyors grid overlaid on the varied topography around the oldest 19th century railway suburbs of Eastwood, West Ryde and Denistone.
- The formal grid overlaid on the mid 20th century residential suburbs over the farmlands of Ryde, North Ryde, Gladesville and Putney.
- The curved street structure of the streets in the newer suburbs to the east such as Chatswood West and East Ryde.

- The recent residential areas formed from a change of use of Marsfield and Macquarie Park.

To assist in the planning process for an LGA wide masterplan the street types can be categorised according to the following types:

- Main roads
- Feeder roads
- Residential streets

MAIN ROADS

These are the main city wide connection roads, highways and expressways under the jurisdiction and ownership of the Roads and Maritime Service (RMS). Council has an overlap with the RMS in the design and layout of verges, mainly through footpath provision and maintenance. Street tree maintenance is carried out by the RMS however apart from freeways tree planting is mostly undertaken by Council.

There are considerable constraints with street tree implementation along these main roads. The RMS have stringent regulations and guidelines regarding street tree planting. Road safety is the principle consideration for the RMS.

The RMS objectives for this street typology include:

- Maintain RMS Clear Zones- no infrangible objects (street trees)are to be planted within three (3) metres of the back of kerb in 40 60km/h zones No trees within four (4) metres of 70km/h zones and 5 metres of 80 km/h zones. This affects most RMS roads in the Ryde LGA. This only effects new street tree planting.
- Median Strips- the above criteria would preclude street tree planting in medians where they exist.
- Avoid awnings and overhead services- this is a common constraint across many of the street types.
- Allow adequate sight distances this includes regulations for stopping sight distances, approach site distances, and to regulatory signage. Trees selection where planting is possible is determined by strict requirements relating to sightlines (clear trunked tall trees) and maintenance and longevity.

These are the cross suburb connection roads that are under direct jurisdiction and control of Council. These roads are often a similar geometry, house setbacks and dimension to the residential streets although have the following differences and characteristics:

- High through volume traffic
- Services (including high voltage powerlines) and safety sight line constraints
- Awnings adjacent to smaller shopping centres
- Can determine or enforce the suburb wide character due to a higher familiarity with street users
- Verge sizes can be more limited than residential streets due to the size of the carriageway and provision of off street parking.

The road geometry is on average 3.6 metres wide however there are some areas where this is greater.

Planting Objectives for Main Roads

- Trees should have a good shade rating to provide shade to the footpath adjacent and if possible part of the carriageway.
- Trees to have a clear trunk to metres (formative pruning) for safe and clear sightlines.
- Trees with consistent form for design cohesion and unity in road corridors.
- Tree selections should be minimal for consistent maintenance regimes.
- Trees with a high scoring litter drop rating, particularly branches or fruit
- Trees to be long lived to reduce maintenance and succession planting.
- Evergreen trees are preferable however deciduous may be useful near shopping centres or areas of full width paving.

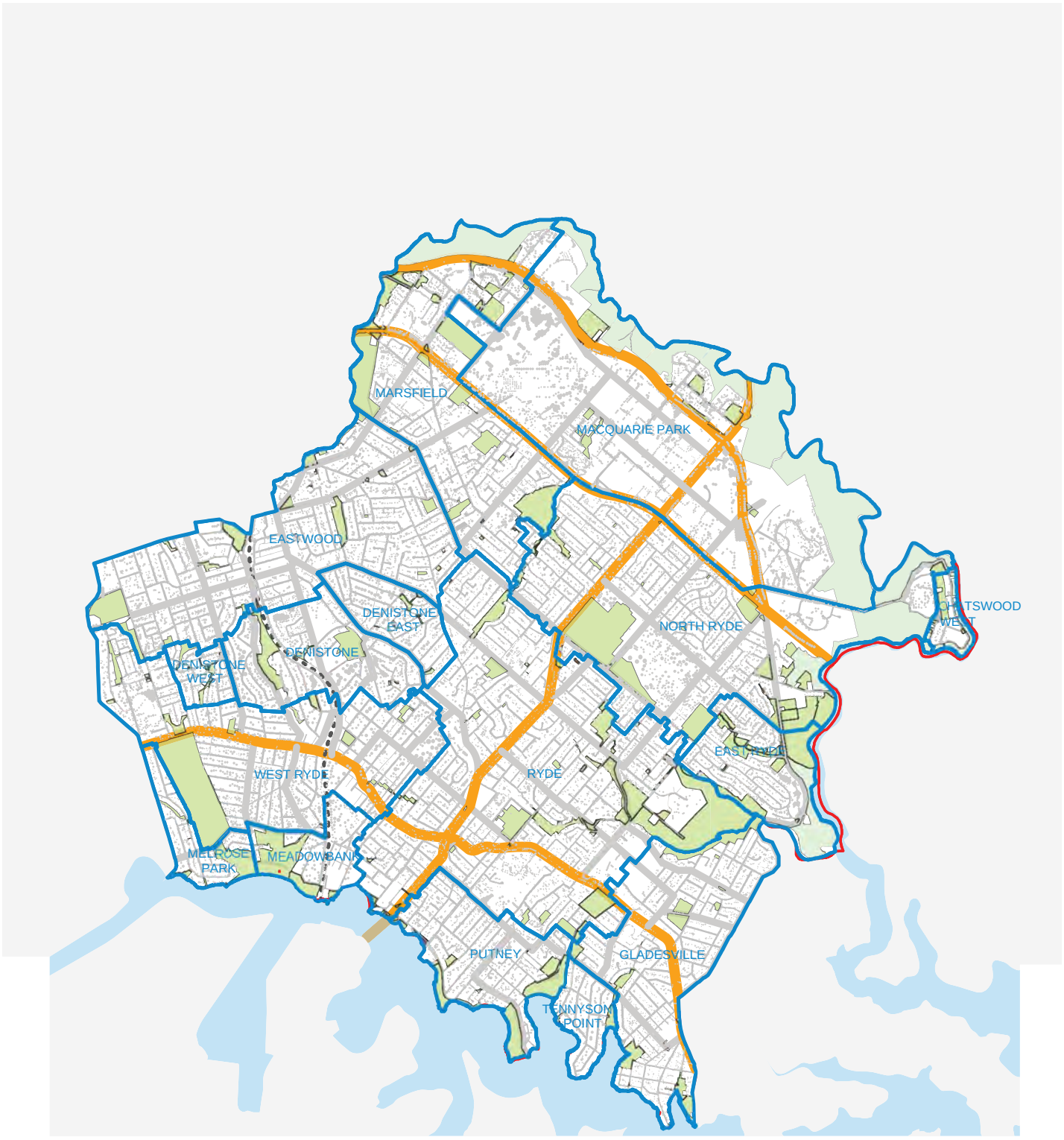


Figure MI.02 - Main Roads

Scale: 1:50,000

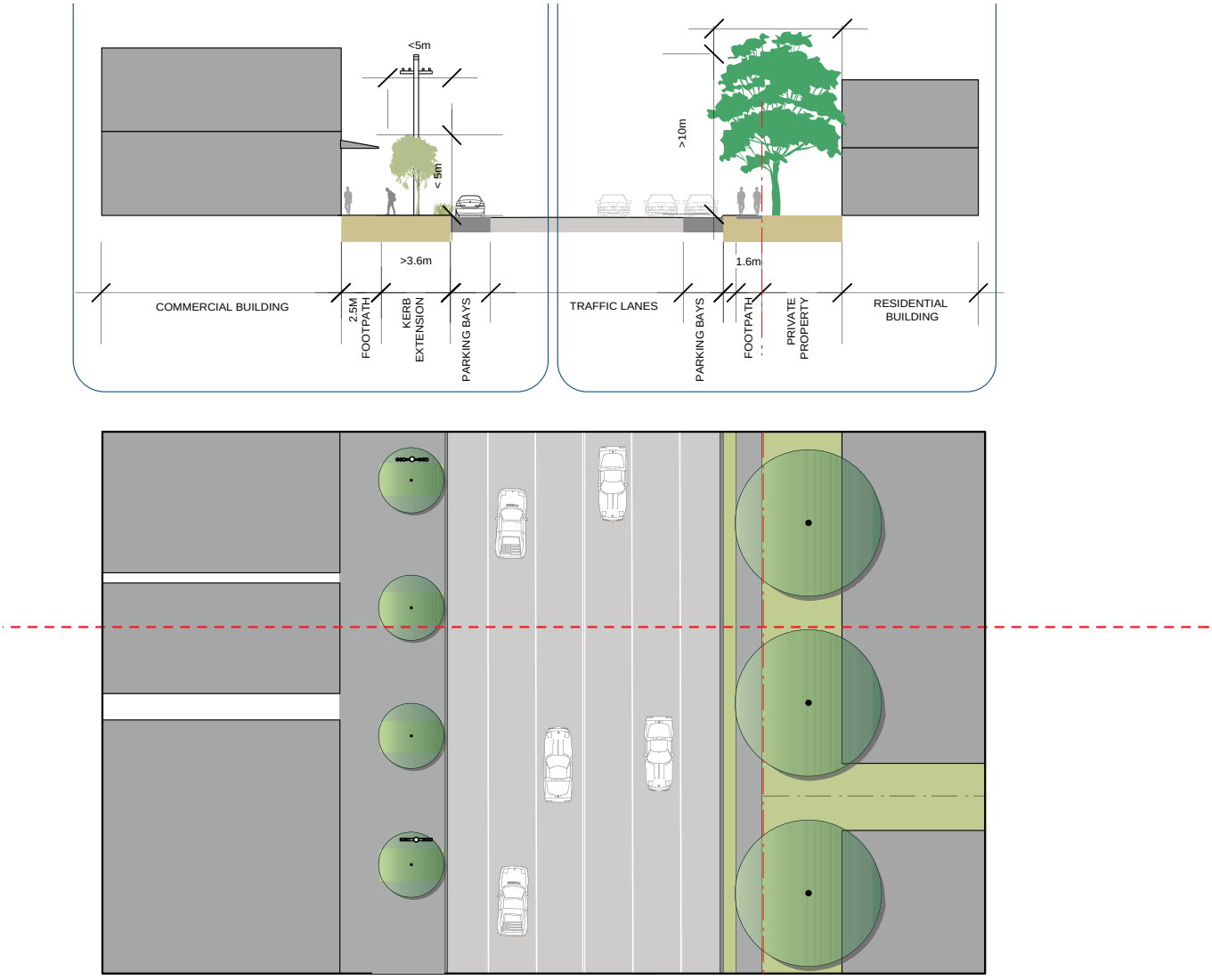


Figure MI.03 - Dimensional Constraints for Trees on Main Roads

Description of Key Characteristics

Street Width	Up to 17 metres. Verge width < 3.6 metres
Traffic Lanes	2 lanes with a parkway except in clearway.
Overhead	Powerlines one side only.
Buildings	Awnings in the Gladesville town centre.
Pathways	1.6 metre footpath average, full width in Gladesville
Tree height	>10m (no powerlines) <5m with (powerlines)
Tree canopy width	>8m < 15m in private property or beyond 5m from the road kerb.
Formative pruned	To be clear trunked to 2m minimum.
Maintenance requirements	< 4 out of 5.
Longevity	< 4 out of 5
Shade Rating	> 3 out of 5.
Drought tolerance rating	> 3 out of 5
Examples	Victoria Road.

- Trees to be a minimum dimension to suit the appropriate scale.
- Trees to have a proven performance, using locally indigenous species with no strong precedent would be a risk.
- Trees should have a high scoring adaptability rating.
- There is little scope for planting in the freeway verges as generally this is an area RMS manages more pro actively.

FEEDER ROADS

As the next level in the street hierarchy, feeder roads are managed by the City of Ryde and are vital secondary roads for traffic movement throughout the City.

The design objectives for the feeder street type include

- Creating a strong sense of street tree planting rhythm for a sense of cohesion.
- Tree planting that responds to available verge width - wide and narrow.
- Provides a cohesive character that also responds to varying soil conditions.
- Creates a street tree character that uses a 'higher order' hierarchy of formality, consistency of tree form and suburb identity.
- Less opportunity for selection criteria based on habitat connection, heritage and diversity goals compared with residential streets.

Wide Verge Criteria Includes:

- 3.6 metres to 7 metres.
- Tree height greater than 10 metres.
- Tree canopy width greater than 8 metres.
- Tree with consistent habit and form.
- Option for under powerlines, tree height less than 6 metres.

Narrow Verge Criteria Includes:

- 2 metres to 3.6 metres.
- Tree height between 6 and 10 metres.
- Tree canopy width up to 10 metres.
- Tree with consistent habit and form.
- Option for under powerlines, tree height less than 6 metres.

Planting Objectives for Feeder Streets:

- Trees should have a good shade rating to provide shade to the footpath adjacent and if possible part of the carriageway.
- Trees to have a clear trunk to two (2) metres (formative pruning) for safe and clear sightlines.
- Trees with consistent form for design cohesion and unity in road corridors.
- Tree selections should be minimal for consistent maintenance regimes.
- Trees to be long lived to reduce maintenance and succession planting.
- Evergreen trees are preferable, however deciduous may be useful near shopping centres or areas of full width paving.
- Trees to be a minimum dimension to suit the appropriate scale.
- Trees can be trail species as the higher soil volumes could support species with lower tolerance rating to site challenges.
- Trees need to have a high rating with pollution tolerance.

Figure MI.04 - Feeder Roads

Scale: 1:50,000

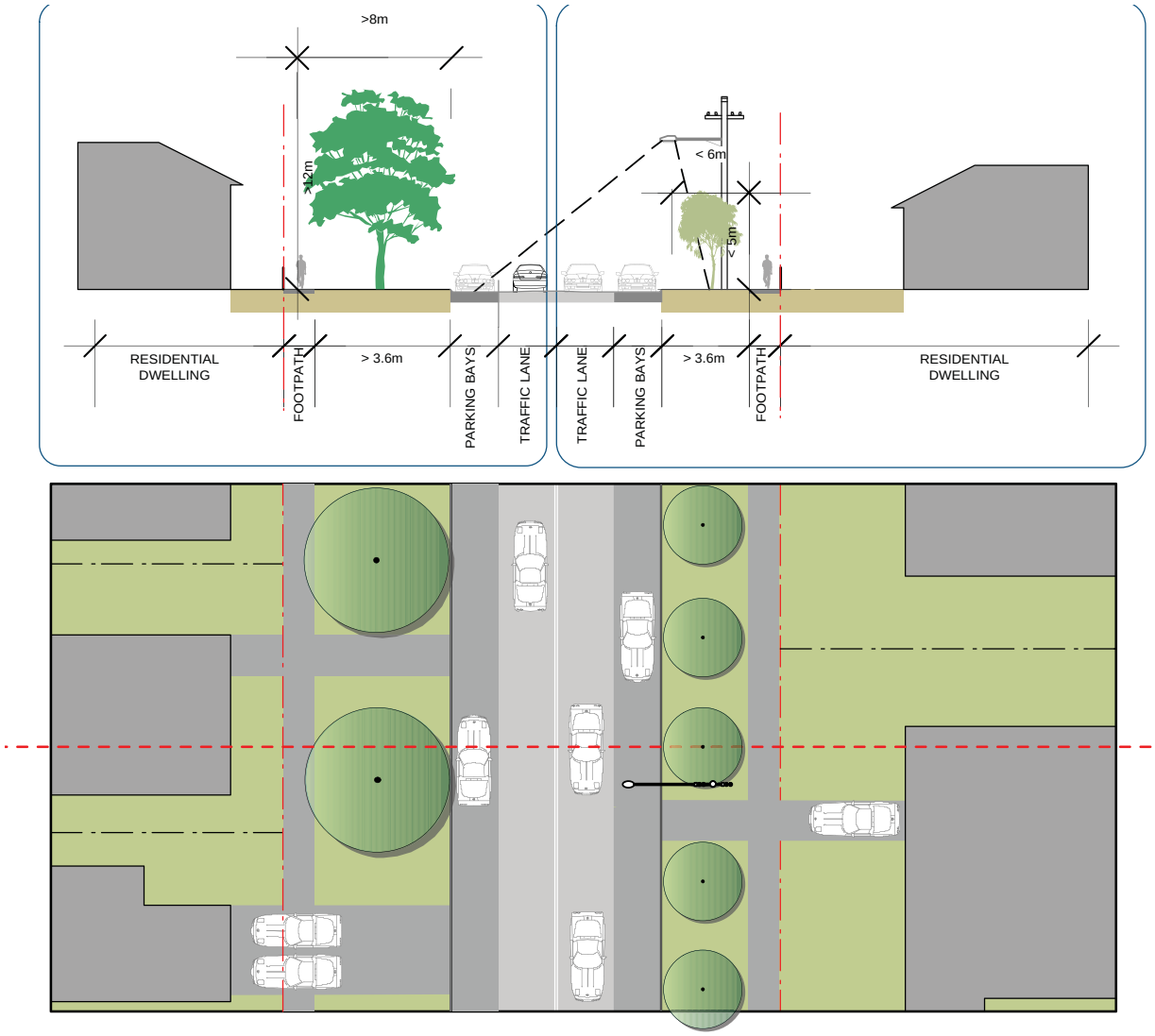


Figure MI.05 - Feeder Streets Wide Verge

Description of Key Characteristics

Street Width	up to 12 metres. Verge width > 3.6 metres (not including footpath)
Traffic Lanes	2 lanes including parking
Overhead	Powerlines one side only in most instances. Occasionally high voltage in addition.
Buildings	Awnings in the neighbourhood shopping town centre.
Pathways	1.6 metre footpath average.
Tree height	>12m (no powerlines) <5m with powerlines
Tree canopy width	>8m (no powerlines) >5m with powerlines
Formative pruned	To be clear trunked to 2m minimum> Consistent form
Maintenance requirements	> 3 out of 5.
Longevity	> 3 out of 5
Shade Rating	> 3 out of 5.
Examples	Tennyson Road Gladesville

RESIDENTIAL STREETS

The residential streets of the City of Ryde have huge potential for expansion of the Urban Forest and implementation of the Urban Forest Policy objectives.

While more overhead services exist and in some instances the verges are narrower, the conditions for growing street trees in general provide greater opportunities than in the other street area.

Residential street verges have the space where appreciable tree canopy cover can be located.

Many residential streets have wide verges with no power lines, incidental street geometry opportunities such as medians and parking lanes with lower frequency usage, little soil compaction from pedestrian traffic, and good solar access year round.

Residential streets provide a range of street conditions and types including:

- Street geometry and width
- Overhead services or not
- Access to sufficient soil volumes
- Parking arrangements
- Precinct character
- Water sensitive urban design opportunities
- Habitat connection

A large selection of tree species is required to reflect this broad range of planting situations.

Shorter streets and more diverse streetscape characters suits a finer grain of planting than in the feeder streets and main roads.

Consistency of form, and strong avenue character are not as important as the previous street types, as diverse tree shapes can enhance the local character of a residential street. This does not mean that a particular streetscape in a residential area can be ad hoc, chaotic or unsuitable to the character of the area. The Street Tree Precinct Plans provides guidance on design criteria of streetscape character and aesthetics.

The use of deciduous trees, natives , exotics or endemic tree species will significantly affect the character of the suburb. This STM provides a wide selection of suitable trees for any particular scenario, however there are still tree species that impart the wrong character for an area. There are very different landscape characters for example Eastwood compared with Macquarie Park or Chatswood West.

Wide Verge Criteria Includes:

- 3.6 metres to 5 metres.
- Tree height greater than 10 metres.
- Tree canopy width greater than 8 metres.
- A wide selection to respond to the site objectives and criteria requirements.
- Option for under powerlines, tree height less than 6 metres.

Narrow Verge Criteria Includes:

- 2 metres to 3.6 Metres.

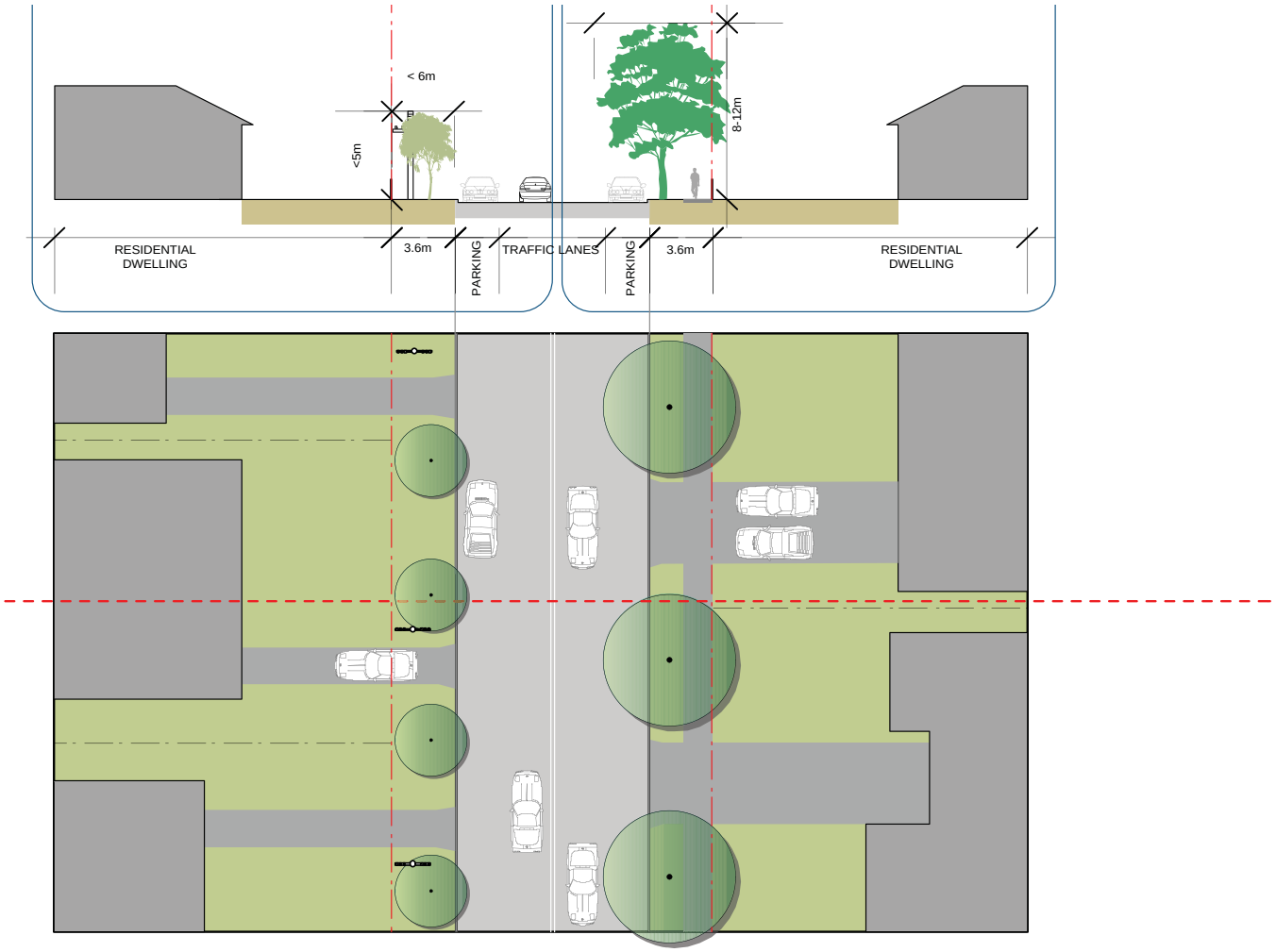


Figure MI.06 - Feeder Streets Narrow Verge

Description of Key Characteristics

Street Width	Up to 12 metres. Verge width < 3.6 metres and may include a footpath.
Traffic Lanes	2 lanes including parking
Overhead	Powerlines one side only in most instances. Occasionally high voltage in addition.
Buildings	Awnings in the neighbourhood shopping town centre.
Pathways	1.6 metre footpath average.
Tree height	8- 12m (no powerlines) <5m with powerlines
Tree canopy width	6-10m (no powerlines) <6m with powerlines
Formative pruned	To be clear trunked to 2m minimum> Consistent form
Maintenance requirements	> 3 out of 5.
Longevity	> 3 out of 5
Shade Rating	> 3 out of 5.
Drought tolerance	> 3 out of 5.
Pollution tolerance	> 3 out of 5
Examples	Morrison Road Gladesville

This photo representation shows where opportunities exist for introducing street trees. Tree size is appropriate to spatial allocation in the verge of where overhead services exist.

- Tree height between 6 and 10 metres.
- Tree canopy width up to 10 metres.
- A wide selection to respond to the site objectives and criteria requirements.
- Option for under powerlines, tree height less than 6 metres.

Planting Objectives for Residential Streets:

- Trees should have a good shade rating to provide shade to the footpath adjacent and if possible part of the carriageway.
- Trees to have a clear trunk to one (1) metre (formative pruning).
- Trees can have a greater range of form and provenance.
- Tree selections can be wide to achieve greater diversity and adapt to differences in street conditions.
- Trees can be short to long lived depending on site objectives.
- Deciduous or evergreen tree suitability depends on precinct character.
- Trees to have a dimension to suit the appropriate scale and site constraints.
- Trial trees can be successful here, particularly if supported by residents and community.
- Trees can have a greater range of adaptability performance.
- Trees can be trial species as the higher soil volumes could support species with lower tolerance rating to site challenges.

This photo representation of the street above shows the potential transformation when wide verges in residential streets are planted to full potential.

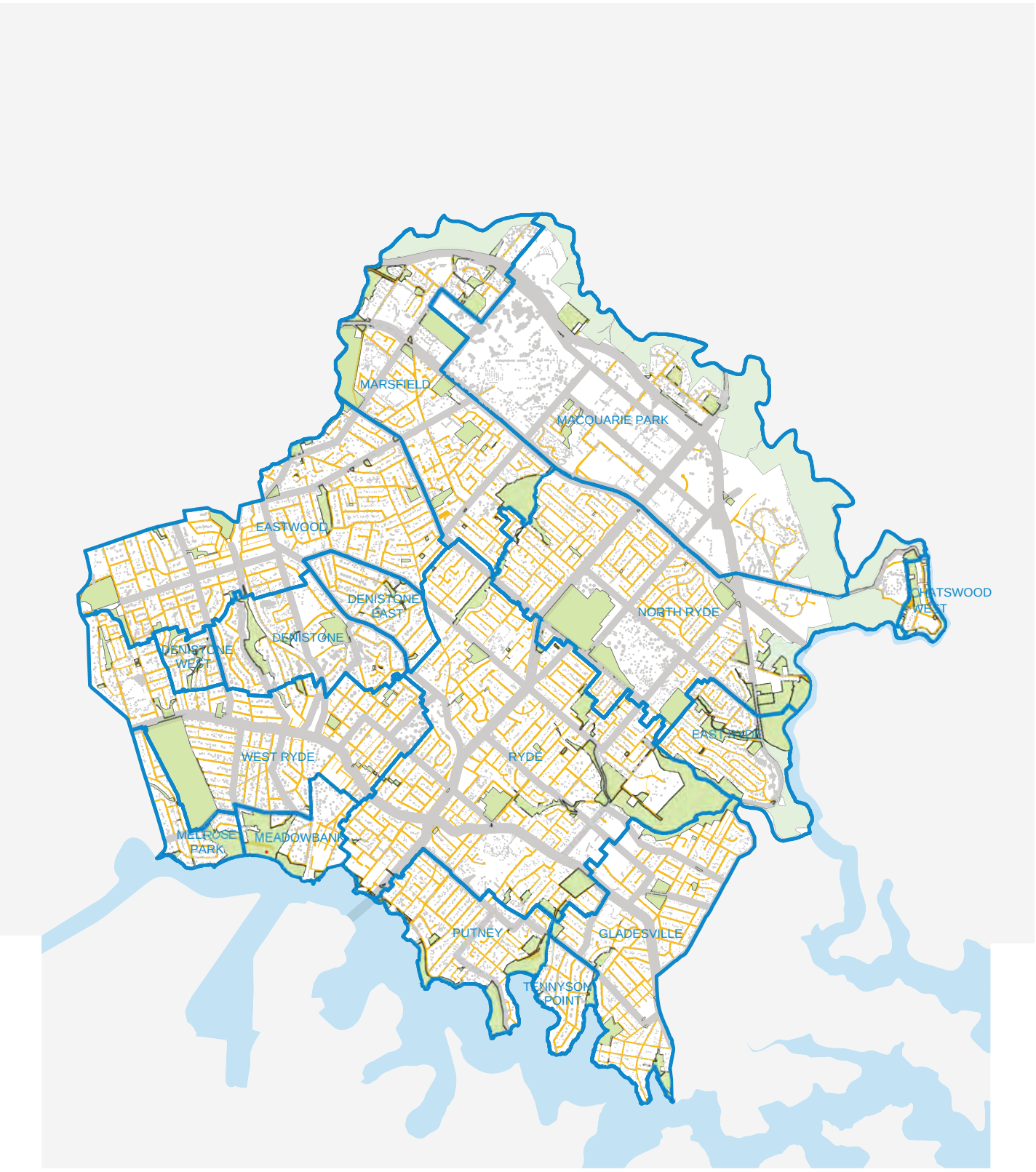


Figure MI.07 - Residential Roads

Scale: 1:50,000

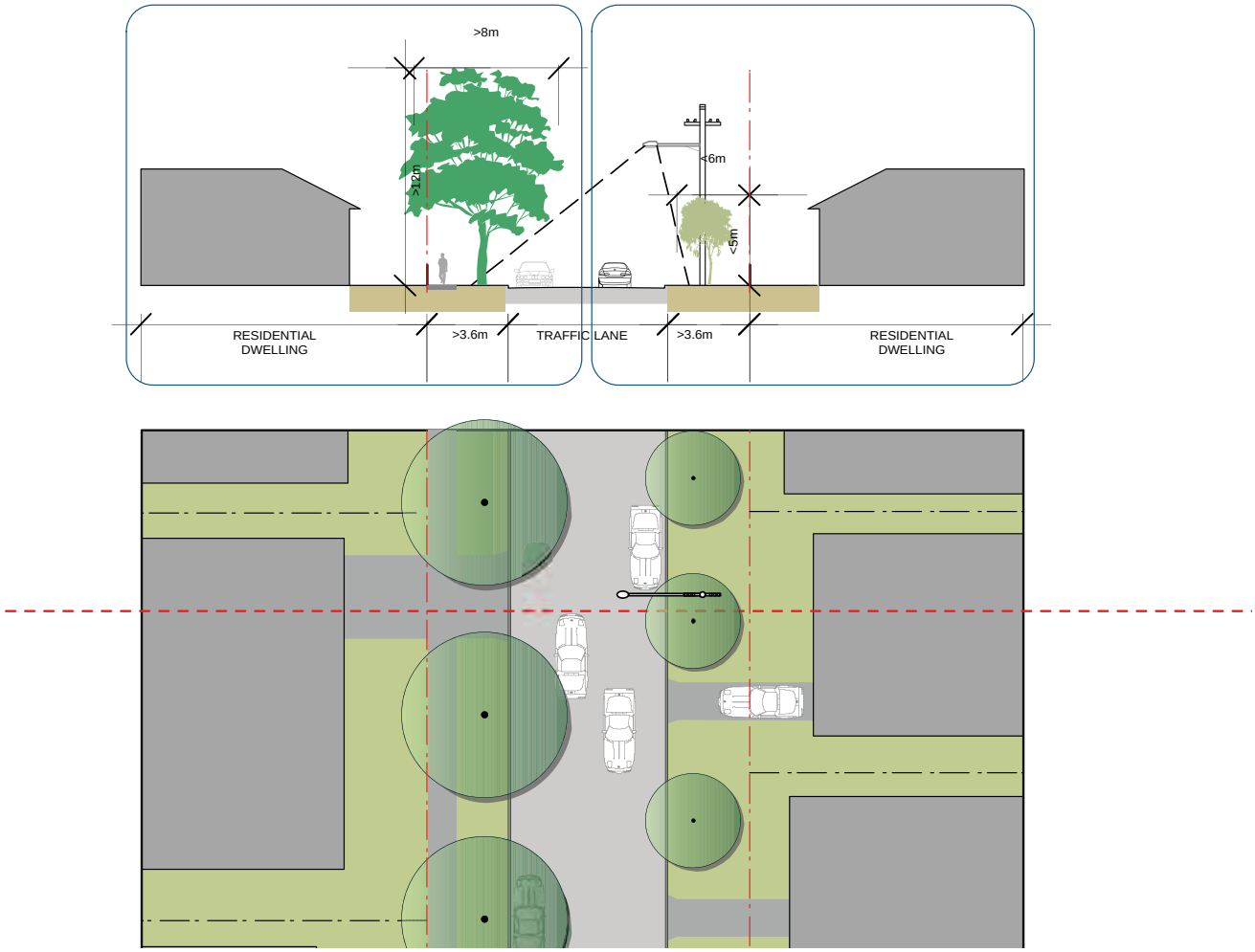


Figure MI.08 - Residential Streets Wide Verge

Description of Key Characteristics

Street Width	Up to 10 metres. Verge width > 3.6 metres and may include a footpath.
Traffic Lanes	2 lanes including parking (usually on one side only)
Overhead	Powerlines one side only in most instances. Occasionally high voltage in addition.
Pathways	1.6 metre footpath average.
Tree height	>12m (no powerlines) <5m with powerlines
Tree canopy width	>8m (no powerlines) >5m with powerlines
Formative pruned	To be clear trunked to 1m minimum
Maintenance requirements	> 3 out of 5.
Longevity	> 3 out of 5
Shade Rating	> 3 out of 5.
Drought tolerance	> 3 out of 5.
Examples	Morrison Road Gladesville and Argyle Street Ryde

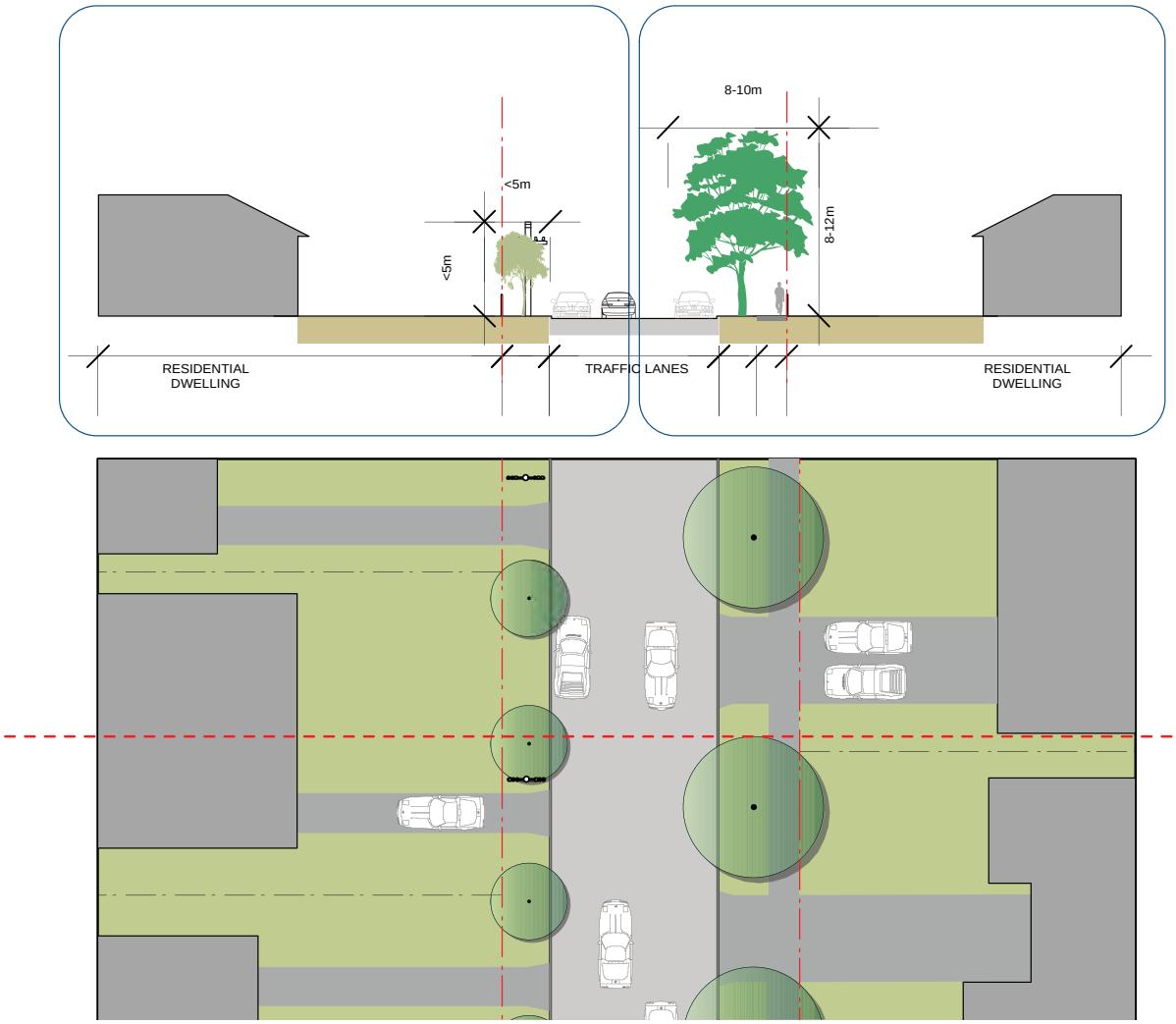


Figure MI.09 - Residential Streets Narrow Verge

Description of Key Characteristics

Street Width	Up to 10 metres. Verge width < 3.6 metres and may include a footpath.
Traffic Lanes	2 lanes including parking
Overhead	Powerlines one side only in most instances. Occasionally high voltage in addition.
Buildings	Awnings in the neighbourhood shopping town centre.
Pathways	1.6 metre footpath average.
Tree height	8- 12m (no powerlines) <5m with powerlines
Tree canopy width	6-10m (no powerlines) >5m with powerlines
Formative pruned	To be clear trunked to 1m
Maintenance requirements	> 3 out of 5.
Longevity	> 3 out of 5
Shade Rating	> 3 out of 5.
Drought tolerance	> 3 out of 5.
Examples	Morrison Road Gladesville

This photo representation of a streetscape with all opportunities utilised for increasing streetscape amenity and street tree canopy cover.

TOWN CENTRES

Town centres and shopping centres are an important part of the public domain where street trees make a positive contribution.

There are a number of town centres and shopping strips in the City of Ryde and the size and character of these centres varies greatly. The large town centres and shopping centres in Eastwood, Top Ryde and West Ryde are in a period of redevelopment that has been coordinated from a state government strategic planning level.

The Public Domain Technical Manual and Town Centre Plans have listed the use of certain species for the town centres within Ryde. The STM provides a shortlist of tree species for town centres, which is LGA compatible with The Public Domain Technical Manual and Town Centre Plans in several instances. In others where there are species not consistent with this STM the species selection should be reviewed as the Public Domain Plan precedes the analysis and arboricultural assessment undertaken in this STM.

The size, operations and street activity of these shopping centres can limit the use of street trees traditionally. The development of tree planting technologies and pavement supporting and porous pavements mean that street trees and good pedestrian flows and growing requirement can both be accommodated. It is important that these opportunities are investigated as suitable tree species growth contributes greatly to the amenity, usability and success of outdoor spaces in retail areas.

There are unique opportunities in Ryde's older, smaller and localised suburban shopping 'villages'. The rise of a local cafe culture in all urban centres in Australia means that people are spending more time in these local retail areas bring a positive sense of local community.

Cox's Road Shops, East Ryde and Putney are excellent examples of where local communities are shunning larger malls particularly for essential goods and services and social interaction.

Street trees in these local centres can provide a distinct and memorable character to the precinct, shade in summer and sun in winter and contribute to the social sustainability of the suburb. Amenity provision and tree adaptability are the principle selection criteria.

Tree selections for town centres should have the following requirements.

- Use their maximum growing potential where space allows.
- Use deciduous trees in town centres that are suitable for this landscape character.
- Evergreen trees should have a high shade rating (greater than three (3) in reference to the tree selection matrix).
- Should have a clear trunk ultimately of 1.8 metres minimum at maturity for good sightlines and access.
- Should not have tree litter or nuisance habits where people use outdoor dining areas, high use pavements and car parking.
- Be able to be formatively pruned and be a species with consistent form (unless used as a specimen).

Eastwood town centre is proposed to be upgraded with new street trees. This environment is particularly challenging and will require of parking lane options for tree planting.

- Careful and considered use of native and endemic myrtaceous species, they may be unsuitable in many instances.
- Be a species that is highly adaptable. This includes tree tolerance to compacted pavements, heat, drought and wind.

The smaller town centres provide opportunities for streetscapes retrofit. The parking areas in these centres can be used for hit and miss car parking where it can be supported. Many of the shopping centres such as East Ryde have exceptionally deep, oversized car parking spaces that could be shortened to accommodate new rows of street trees.

Opportunities for new tree planting needs to be in consultation with business owners and the local community. There are likely to be town centres or shopping strips more receptive than others. Those will help prioritise projects for effective outcomes.

Tree planting in town centres can be incorporated with WSUD. Coordination with the town centre plans and the WSUD strategy will enable realisation of Council's tree planting objectives.

Changes to the footpath location can create opportunities for widening the turf verge as this rendering illustrates.

On the fringes of town centres street tree planting can be increased in the grass verge zones. There are a number of scenarios were adjusting the footpath location in a grassed verge can immediately provide a better and sustainable street tree planting opportunity.

Planting Objectives for Town Centres

- Trees planting layout and planning should reference the City of Ryde Public Domain Technical Manual and The Town Centre Plans.
- Trees should have a good shade rating to provide shade to the footpath adjacent.
- Trees to have a clear trunk to metres (formative pruning) for safe and clear sightlines.
- Trees with consistent form for design cohesion and unity in town centres.
- Trees with a high scoring litter drop rating, particularly branches or fruit.
- Deciduous trees generally preferable due to amenity all year and consistency of form and selection.
- Trees to be a minimum dimension to suit the appropriate scale.
- Trees to have a proven performance, in built up environments.
- Trees should have a high scoring adaptability rating.
- Trees can be incorporated with WSUD objectives and opportunities.
- Exotic or smaller native trees with good shade rating preferred.
- Trees need to have a low potential for creating allergenic reactions or other health concerns.

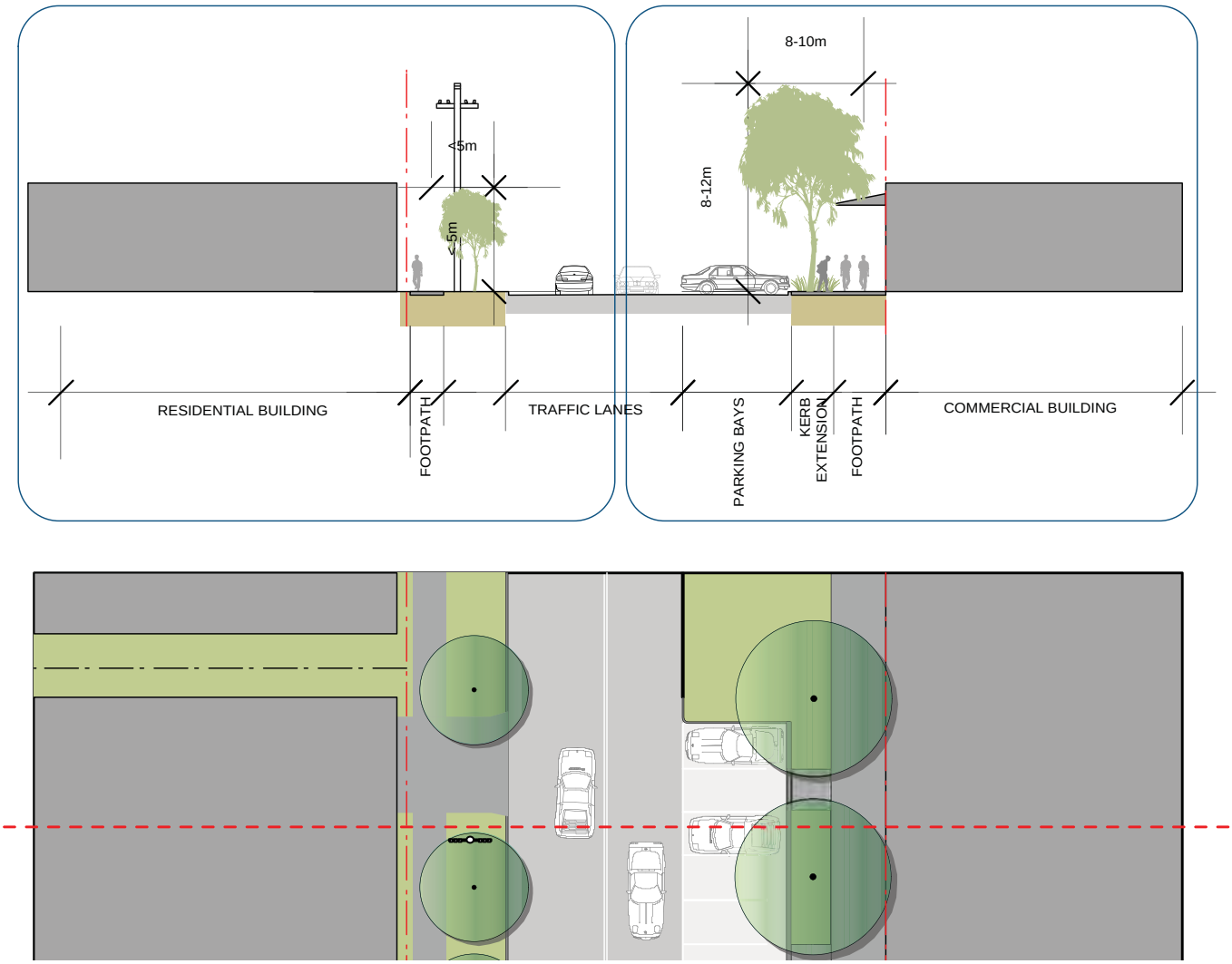


Figure MI.10 - Street Tree Type and Selection - Town Centres

Description of Key Characteristics

Street Width	Up to 17 metres. Verge width < 3.6 metres
Traffic Lanes	2 lanes with parking either 90 degrees or parallel.
Overhead	Powerlines one side only.
Buildings	Awnings in many of the neighbourhood centres
Pathways	Full width in many instances.
Tree height	8 - 12m (no powerlines) <5m with powerlines.
Tree canopy width	8 -10m (no powerlines, <5m with powerlines.
Formative pruned	To be clear trunked to 2m minimum.
Maintenance requirements	> 4 out of 5.
Longevity	> 4 out of 5
Shade Rating	> 3 out of 5.
Community Health concerns	>4 out of 5.
Examples	East Ryde shops.

A photo representation showing how simple rationalisation of car parking spaces, with no loss of capacity. The streetscape environment is transformed with street trees and a landscape separation. The footpath will be more conducive to spill out space for retail outlets.

HABITAT CORRIDOR CONNECTIONS

Habitat Importance Criteria

The integration of the STM and Council's objectives for connecting habitat corridors will need to be closely co-ordinated. As with the Urban Forest, the success of habitat corridors will rely on planting within the private and public domain.

This criteria selection determined by the consultant ecologist (Eco-Logical Australia) is guided by existing documents and scrutinised by Council staff and the community.

As with all street trees however, suitable habitat provision trees need to be appropriate for a streetscape. Species need to be the right scale and size for the available space, generally need to be able to be formatively pruned for under story sightlines, not be hazardous and preferably have a long lifespan. The provision of thick understory is important for the habitat objectives of the corridor connections. Smaller dense trees such as the Acacia species selected may assist in this objective where it is possible in streets.

The habitat corridors would take precedence over the general street tree selections where these areas are designated in the precinct plans.

The STM provides a number of selections for any given site. There may be some community fears of using large species such as Eucalypts and Angophoras. There are a number of options that can be presented to the community at implementation if there are concerns. While it is a goal for the STM to explore the full potential that a tree planting opportunity can give in terms of size, this may not always be possible, if the tree species could potentially become hazardous.

Objectives:

- Concentrate the use of endemic species along mapped habitat corridors.
- Use the estimated distribution maps of Ryde's vegetation communities pre 1750's and 1950's to assist with species selection
- Link with other wildlife corridor projects in adjacent Council's example, the Habitat Network Project, which is working with Hunters Hill LGA to create a continuous small bird habitat corridor from upper reaches of Tarban Creek through reserves to Gladesville Hospital.
- Co-ordinate with the Rivers to Rivers Corridor project (The NSW Environmental Trust and the Sydney Metropolitan Catchment Management Authority (SMCMA)) working in partnership with Hunters Hill Council to create two bushland and wildlife enhancing corridors connecting the Parramatta River and Lane Cove River foreshore parks with key habitat in the Field of Mars and Lane Cove National Park.
- Maximise the use of endemic species sourced from provenance seed in the vicinity of remnant bushland.
- Use a diverse mix of species including autumn/ winter flowering species and species with dense/spike foliage.

Additional Habitat Considerations

Guidance on additional habitat considerations was taken from the website of the *Australian Association of Bush Regenerators*.

- Restrict the number of succulent fruit bearing trees (both endemic and exotic) where Pied Currawongs are a problem.
- Eucalypt, Angophora and Banksia species provide both foraging and shelter habitat for a range of fauna species.
- Melaleuca species provide a dense canopy for small birds to shelter and nest.
- Avoid planting trees which attract fauna to potentially hazardous locations – e.g. flowering shrubs on the median strip of a busy road.

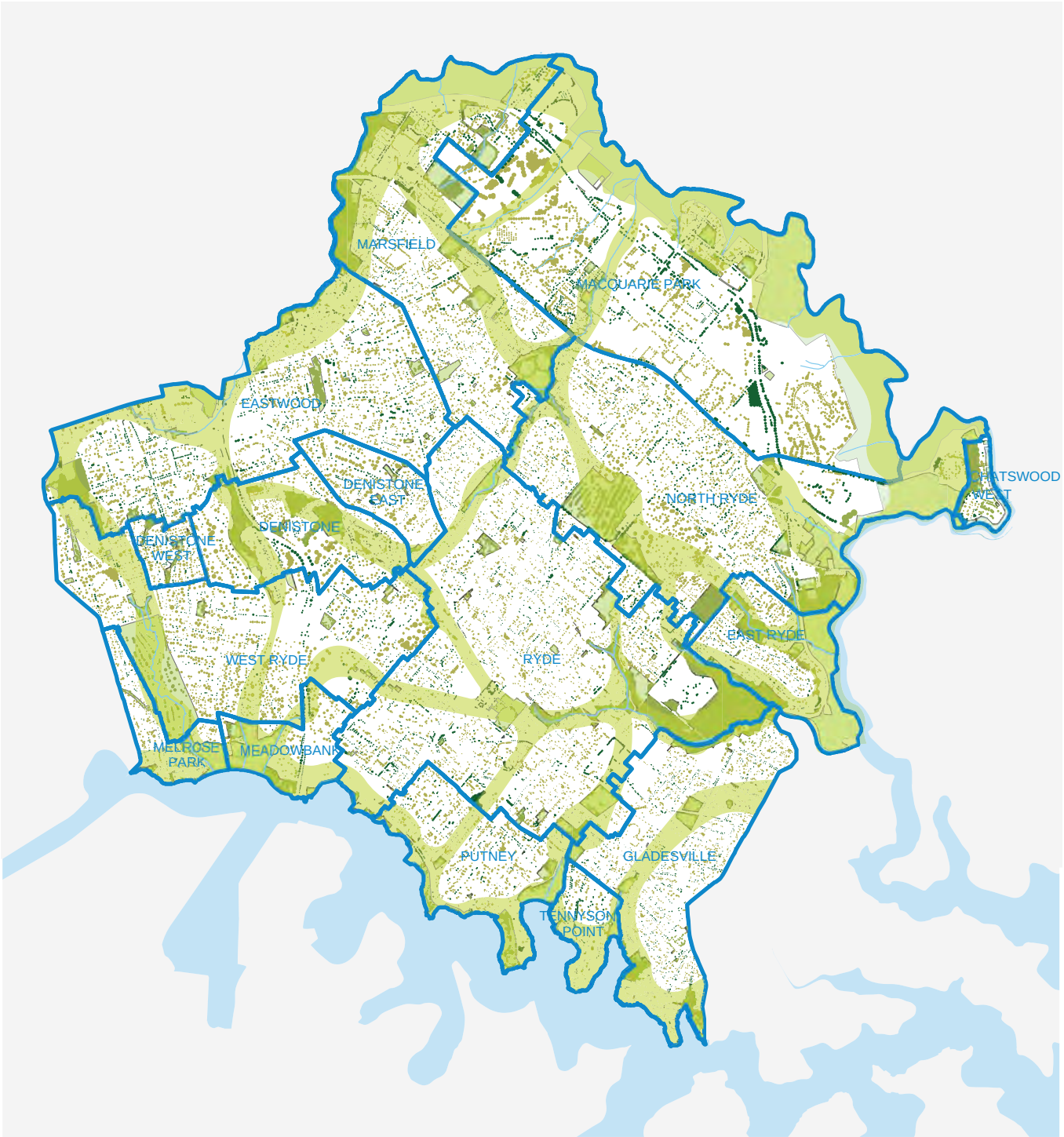


Figure MI.11 - Habitat Corridors

Scale: 1:50,000

KEY

- Trees in Private Property
- Trees in Public Streetscape
- Green Web
- Waterways

PARK AND OPEN SPACE INTERFACE PLANTING

Park trees are generally larger tree species and cultivars suitable for planting in larger open spaces with reduced above and below ground constraints. Trees are generally able to develop a natural form and reach their full canopy size.

Trees for habitat corridors can also make suitable park edge trees, particularly the larger Eucalypts, Angophoras and Corymbias.

Tree selections for parks and open spaces should have the following requirements:

- Use large trees without spatial constraints, to allow contribution to the Urban Forest canopy cover.
- With no powerline constraints, tree selection height greater than 10 metres.
- Can utilise larger native and endemic species while there are no powerlines.
- Tree canopy width greater than 8 metres.
- Tree species selection should be appropriate to the landscape character of the park.
- Should have a clear trunk ultimately of minimum 1.8m. Trees at maturity to allow clear sightlines into the park for public safety Crime Prevention Through Environmental Design (CPTED) and connectivity to the adjacent street.
- It may be preferable to plant a park edge streetscape within the park setback from powerlines.
- Able to be formatively pruned and be a species with consistent form (unless used as a specimen).

There are opportunities at many of Ryde park edges for additional street tree planting or infill planting. This park in East Ryde would benefit from large scale tree planting. Use of large locally endemic species would be appropriate in this habitat corridor zone.

Photo representation: larger locally endemic trees are ideal for park edges as this photo montage shows as these species can be not favoured closer to private houses or in more built up areas.

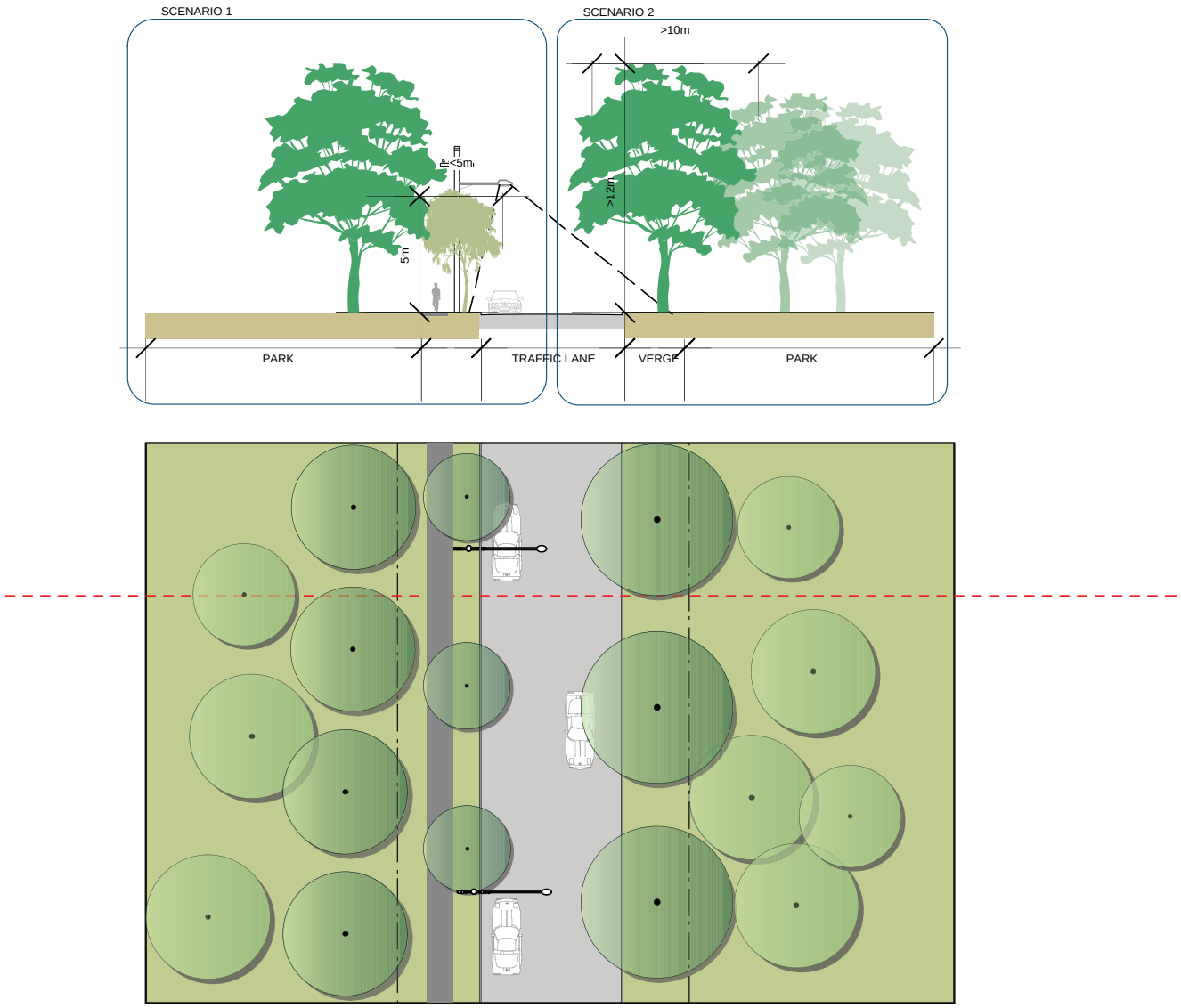


Figure MI.12 - Street Tree Type and Planting - Park Edges

Description of Key Characteristics

Overhead	Powerlines one side only.
Pathways	Full width in many instances.
Tree height	>12m (no powerlines) < 5m with powerlines.
Tree canopy width	>10m no powerlines, <5m with powerlines.
Formative pruned	To be clear trunked to 2m minimum.
Maintenance requirements	> 4 out of 5.
Longevity	> 4 out of 5
Shade Rating	> 3 out of 5.
Community Health concerns	>4 out of 5.
Examples	Eastwood Park

WSUD OPPORTUNITIES

The use of street tree planting combined with a Water Sensitive Urban Design (WSUD) strategy enables a number of Council policy objectives to be realised within one project. A good example of this in the Ryde LGA is potentially combining the River to River corridors project to achieve Councils street tree planting, WSUD and biodiversity strategies within the one project.

The growing of street trees and achieving WSUD objectives can be integrated. There are many benefits to doing this including:

- Passive irrigation of trees, particularly in low flow rainfall events.
- Potential for filtering of stormwater nutrients and suspended solids in stormwater.
- Incorporating Council's stormwater treatment objectives and street tree planting objectives.
- Combined project budgets to make projects potentially easier to fund.
- Maximising available tree root soil volumes and filter media area.
- Possibility of incorporating porous pavements contributing to stormwater filtering that enables better pedestrian accessibility in built up areas and town centres.
- Combine shading of streets and parking areas with stormwater treatment where they interface- at the kerb line.
- There are many built precedents of the combination of WSUD objectives and tree planting.
- They are an attractive landscape type in an urban or residential environment.

The *Draft Ryde WSUD Strategy 2012* the swales and biofiltration components are areas that can incorporate street tree planting. The objectives and growing conditions for swales and biofiltration are different. Careful selection of species is required to ensure tree growth.

Swales and Buffer Strips

Linear swales are used for stormwater flow conveyance and filtration. They can be located along the street gutter edge within the parking lane or within central medians. There are few central medians in the established parts of Ryde, however there are medians existing and proposed in Macquarie Park that provide opportunities for new swales to be constructed.

Trees should be spaced to allow dense understory vegetation to grow in the swale invert. Trees should have light to moderate shade qualities.

- Swales are more suited to residential areas where cross street pedestrian permeability is not as critical as town centres and shopping strips.
- Trees would need protection if turfed is used in swales to protect young trees from mowing equipment.
- Most importantly, trees need to be waterlogging tolerant as a high infiltration rate is not the key performance objective.

Bioretention Tree Pits in Raingardens

Bioretention systems use soils that are designed to filter and entrap nutrients and biosolids. As a consequence they need to be highly permeable, free draining and hold very little water for as short a period as possible.

These systems require trees that are tolerant of drought as well and periodic inundation. As a consequence of the soil filter media, trees that are suitable for swales may not be able to tolerate the extended periods of dryness in biofiltration tree pits.

Species with planted understorey as part of the biofiltration should have a light to medium shade canopy cast.

Tree pits in Raingardens should be large enough to allow a percentage of the understorey planting to remain unshaden.

Planting Objectives for WSUD

- Trees shade rating can be varied, trees with heavy shade should be avoided if native understorey planting is planned.
- Trees to have a clear trunk to 2 metres can be achieved by the application of formative pruning for safe and clear sight lines as usually the swales or biofiltration pits will be in parking lanes or in the verge.
- Trees can be of mixed provenance, with a selection of exotic, native and locally indigenous to ensure applicability to the street landscape context and character.
- The tree list expands upon the Ryde City WSUD selection guide 2009
- Trees should have a high scoring adaptability rating.
- Trees need to be able to tolerate watterlogging in swales.
- Trees for biofiltration pits need to be adaptable to drying out.
- Trees in bioretention systems and swales would ideally be accompanied with groundcover and tufting understorey to maximise the biological processing of nutrients.
- Trees may be used in conjunction with porous pavement to achieve some filtering of nutrients.

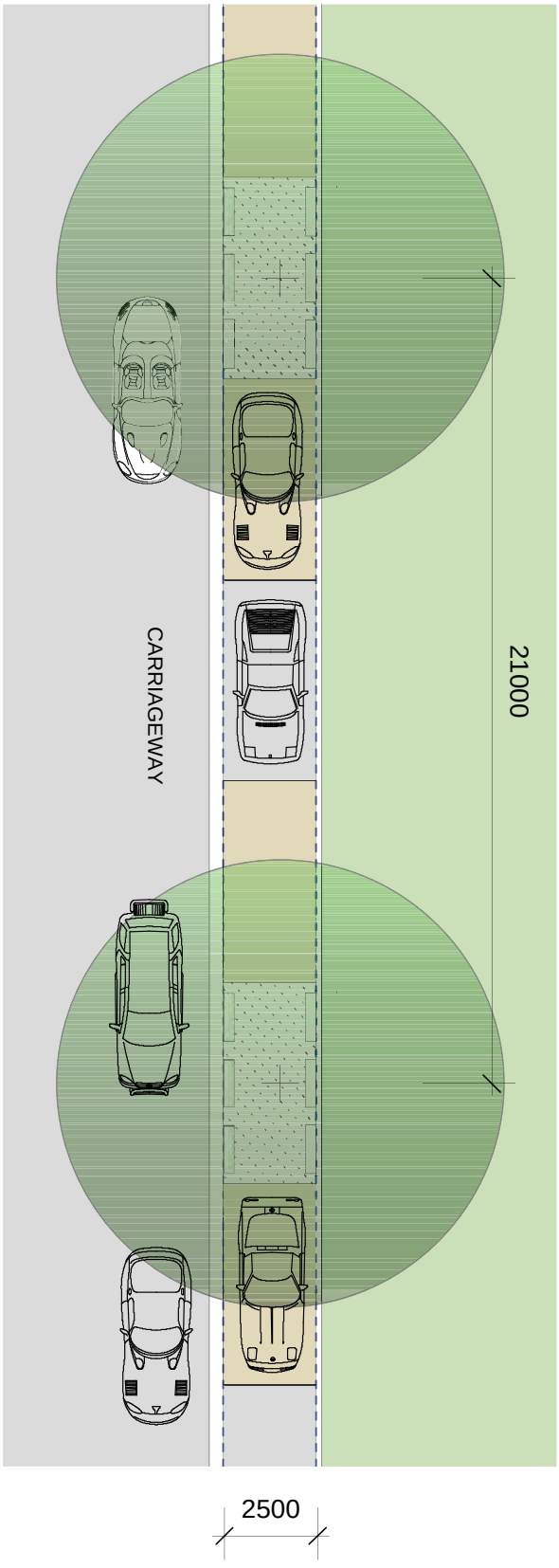


Figure MI.13 - Bioretention Trench and Tree Pit

A large tree of 12 metres canopy size can have touching canopies with the next trees with three car spaces between trees.

HERITAGE PRECINCTS

There are a number of the older pre war plantings of *Lophostemon confertus*, especially in West Ryde, Eastwood and some parts of Gladesville. Most of these have reached maturity and or are starting to decline. The decline is due to the age of the trees and the constant impacts of urban development on the root zone, such as road widening and maintenance of overhead services.

The eventual removal and replacement of these trees is a dilemma due to the potential loss of streetscape character in the parts of Ryde identified. This loss can be avoided with early intervention.

Brushbox avenues should be maintained with senescent trees replaced with young Brushbox. If trees are to be removed it is preferable for this to be done in blocks on both sides of the street. This will ensure there are some sections of the infill planting with trees of a similar form and structure.

There are many heritage conservation areas listed in Council's 2008 consolidated *Local Environment Plan (LEP)* and documented in the *Local Planning Study (Heritage)*. This classification does not identify trees as a contributing determinant. Generally only street trees have been assessed in this report, in heritage conservation areas or remnant avenues from pre WW2 plantings. Currently the City of Ryde Significant Tree Register accounts for individual trees nominated by residents. There are a number of small avenues that will need to be considered for their contribution to heritage precincts and streetscapes.

Planting Objectives for Heritage Areas

- Assess the cultural, historical , scientific and aesthetic significance of tree species within the City of Ryde.
- Determine cultural values of trees, particularly around parks and reserves or trees that mark important buildings or landmarks and which reflect customs or a way of life. An example of this is the Camphor Laurels along Argyle Street at Ryde Park.
- Determine historic value of street trees, particularly the extensive planting of Brushbox at a similar time with the development of the town centres and residential areas at the beginning of last century.
- Determine scientific value of street trees as part of Ryde's natural heritage. There are significant individual remnant trees in streetscapes across the LGA particularly large Eucalypts and Angophora's representing the locally endemic vegetation community, notably the endangered Blue Gum High Forest.
- Determine aesthetic values for assessing heritage value of street trees. Examples of this include the West Ryde Brushbox as they give a distinct local character and provide a sense of streetscape continuity.
- Significant tree register to be updated to help determine particularly the heritage values of remnant tree avenues.
- Trees that have been determined as having significance should have their need for removal weighted against the value of the tree and risk assessment of hazard and public safety.

Remnant Brush Box street trees in Ryde. These trees have survived road widening , formalisation of the kerbs and installation of bitumen in the parking lane.

- As part of the Significant Tree Inventory there needs to be a street tree management and action plan for the street trees nominated and assessed by Council's expert panel.

Figure MI.14 - Aerial Photo

An overlay of the City of Ryde on the 1943 aerial photo 'From the Skies' RTA. This plan clearly shows the detail of the street tree planting that can be cross referenced today to determine the remnant street tree avenues.

IMPLEMENTATION ACTION PLANS

MAIN ROADS ACTION PLAN	
1	Determine if there are tangible benefits from tree planting within the constraints of the RMS safety guidelines.
2	Incorporate planning strategies for building setback of new residents on main roads to allow for street tree planting beyond the infrangible object setback.
3	Liaise with the Roads and Maritime Service centre for Urban Design on potential opportunities and street tree selections.
4	Consider opportunities for relocation of footpaths if this provides opportunities for new tree planting
5	Consider providing incentives for property owners along main roads to plant appropriate trees along their boundary that can have a 'surrogate' contribution to the street.

FEEDER STREETS ACTION PLAN	
1	Develop a selection of street trees from the tree selection matrix that create a strong sense of unity and repetition.
2	Determine species that are suited to a number of soil types, particularly if the feeder road crosses a number of geomorphology types.
3	Prioritise what feeder streets have the best opportunities for successful street tree planting.
4	Select species that are appropriate for allowing clear sightlines.

RESIDENTIAL STREETS ACTION PLAN	
1	Determine from the street tree survey what streets are tree receptive and supportive.
2	Incorporate a strategy of street tree trials in streetscapes conducive to tree planting such as adequate soil volume, width, favourable soil types, etc to build a determine the performance of less proven species.
3	Incorporate the principles of the habitat connection strategy within this street typology where results will be easier to achieve.
4	Create demonstration pilot projects of street tree planting that can be used to gain further support for street tree planting programmes.

TOWN CENTRE STREETS ACTION PLAN	
1	Explore in more detail where spatial opportunities exist in local shopping centres for streetscape improvements and tree planting.
2	Investigate the local shopping centres as a priority for street tree improvements as they will have objectives most easily met with a smaller targeted consultation.
3	Determine a greater input into the planning of streets and public domain delivered as part of private redevelopments.

PARK EDGE STREET TREE ACTION PLAN	
1	Explore possibility of using larger species that are suited to the larger root volume and space.
2	Consider removing low bushy shrubs from the edges of parks to allow better sightlines into reserves for public safety and for better visual connection to the street.
3	Use tree species with single clear trunks and with canopies that can be easily lifted to 3 metres or are naturally high branching.

WSUD STREET TREE ACTION PLAN	
1	Coordinate with Councils engineers to determine where streetscape storrmwater upgrades can be integrated with WSUD strategies.
2	Ensure the developing WSUD strategy incorporates or is referenced to the STMP.
3	Use tree species that are appropriate to raingardens and check if the tree will hinder the effectiveness of raingardens.
4	Ensure documentation of raingarden or infiltration street tree pits is effective and will provide stormwater treatment objectives as well as support healthy tree growth.

Table MI.03 - Implementation Action Plans

Street Tree Technical Information

This chapter identifies the street tree selections for the suburbs in the City of Ryde

The City of Ryde is committed to enhancing the amenity of the streets, public places and buildings through better planning and design which is in response to community expectations and concern for our local environment. Guidelines for management of trees and services are important in the city to minimise conflict between trees and services.

OVERHEAD POWER LINES

Street trees within highly urbanised areas are often located in close proximity to services and other infrastructure, such as overhead power lines. Overhead power lines may limit the size and/or types of trees grown beneath or adjacent to such services, due to conflicts between branching habits and tolerance to severe pruning. Damage to infrastructure can result from roots or from interference from foliage and branches.

Under Section 48 of the *Electricity Supply Act 1995*, minimum distances between tree branches and overhead power lines must be maintained to prevent electrical failures and fires due to contact between branches and wires. The clearance varies and is determined by line voltage.

- Non-insulated, low voltage overhead wires have a minimum clearance of 1.5 metres.
- Power poles in urban areas have a minimum clearance of 2 metres.
- Insulated Aerial Bundled Cables (ABCs) have a minimum clearance of 0.5 metres.

Guidelines for minimum distances between trees and power lines, and trees and street lighting are contained in the *Industry Safety Steering Committee's Guide to Managing Vegetation near Power Lines (2003), and Energy Australia's Tree Safety Management Plan (2002).*

The replacement of overhead power lines with ABCs will minimise severe tree pruning around power lines, limiting risk not only to infrastructure but also to the tree. The conversion to ABCs typically costs around $2 000-$5 000 per span (i.e. between two poles), compared with $56 000 - $80 000 per span when replacing overhead lines with underground cables (Energy Australia).

Energy Australia provides a subsidised program for conversion to ABCs, contributing up to 50% of the conversion cost per span.

UNDERGROUND SERVICES

Nature strips and footpaths provide pedestrian access and opportunity for tree planting but are also corridors for numerous underground services. There is considerable conflict in the management of services and trees within road verges and nature strip areas. Tree roots may cause damage to underground services by direct pressure on conduits as roots grow and expand in diameter, or by entry to hydraulic conduits such as sewer and stormwater lines, causing damage and blockage. Not only do tree roots damage services, but the installation and maintenance of services have a considerable impact on root systems.

In addition, the size and position of underground services in relation to street tree plantings may limit effective root growth and soil root volume thus limiting the optimum size, growth and performance of street trees.

Care must be taken in selection and placement of street trees to minimise the potential conflict and, where possible, tree planting areas and below ground service corridors should be completely separated.

Underground assets include:

- Electricity generation, transmission and distribution cables.
- Rail infrastructure cables.
- Roads & Maritime Services (RMS, formerly Roads and Traffic Authority) equipment and communications cables.
- Telecommunications cables.
- Gas transmission and distribution pipelines.
- Petrochemical (oil, petrol, LPG) pipelines.

- Water pipes.
- Stormwater drainage pipelines.
- Sewerage pipelines.

The identification of all underground services and their position relative to potential and existing tree planting is essential prior to the implementation of any street tree planting program. In certain situations, the number and type of services may limit street tree planting within a street or part of a street.

Dial Before You Dig

This is a free referral service for receiving information on the location of underground pipes and cables prior to the commencement of any ground penetration work. Information can be obtained via dialling 1100 during work hours, or online at www.1100.com.au.

Work Near Underground Assets (WorkCover, 2007)

The Work Near Underground Assets GUide assists in determining appropriate measures to eliminate or control risks to those working near underground services, and provides general information on the typical depth of installation of various underground services.

The depth of pipelines and cables often vary, a reflection of their age as well as surface remodelling over time. Many underground assets are co-located with other assets in shared trenches, however several require mandatory separation. The typical spatial allocations for utility services and depth of cover in road reserves in NSW have been derived from the *NSW Streets Opening Conference: Guide to Codes of Practice for Streets Opening* (2007, SOC).

NSW Streets Opening Conference: Guide to Codes of Practice for Street Opening (2007, SOC)

The Guide to Codes of Practice for Street Openings does not identify the spatial allocation required for street trees in nature strips (road verges) of less than 3.6m wide, which is applicable to the majority of the City of Ryde. Opportunities for tree planting may still exist in these areas where authorities (utility/service providers) do not require reticulation on both sides of the street. Consultation with relevant authorities is recommended by the SOC where trees are proposed in nature strips 3.6m wide or less.

No specific guidelines for separation between underground assets and trees are provided, aside from the above, however general guidelines are included as follows, and should be considered in conjunction with relevant RMS guidelines to ensure compliance:

- Select species that are unlikely to interfere with underground assets or overhead power lines.
- Appropriately locate trees to avoid interference or obstruction with street lighting, considering each species' mature habit and dimensions.
- Select species for use under power lines that have an expected mature height lower than the height of the overhead wires to avoid continual pruning.
- Install root control barriers to protect service conduits, pipes and joints from root incursion and to protect tree species from potential future root damage as a result of future utility excavations.

The use of root control barriers, whilst limiting root incursion to underground services, significantly reduce available soil volume for street trees, and may compromise stability as trees mature through restricting normal root plate development. To avoid instability and underdeveloped species, as well as to minimise potential conflicts between trees and underground services, shared trenching should be promoted and negotiated with the relevant authorities.

Sydney Water Act 1994 - Sections 46

This Act enables the Corporation (Sydney Water) to remove trees where there is reasonable cause to believe that the trees are destroying, damaging or interfering with the Corporation's works (assets).

The onus is on the owner of the tree to ensure

that the tree is planted in circumstances where destruction, interference or damage will not result.

Easements Operational Guidelines (Sydney Water, 2010)

These guidelines prohibit the planting of trees or shrubs within easements without prior consent and recommend avoiding tree planting of certain species within six metres of a wastewater pipeline.

The Best Practice Manual - Tree and Tree Root Management (Statewide Mutual - a NSW Government mutual organisation)

This manual provides a comprehensive approach to risk management associated with trees, addressing legal issues, liability, negligence and the responsibility of management authorities. Strategies are also provided in relation to the potential conflicts between services and trees, an should be considered when planning for new street plantings.

The replacement of this Hills Fig in Gladesville with a more appropriate species, selected for its mature height and habit would limit reliance on Council's resources for continual pruning measures.

VEHICLE CLEARANCES AND SETBACKS

Guidelines for Tree Planting and Maintenance on Urban Roads (RTA, 1987)

These guidelines detail design considerations for tree placement and selection for urban roadways. The planting guidelines vary according to road classification.

Recommended setback distances from roadways and intersections are provided with the guidelines to ensure the provision of adequate clearance, sight lines and traffic safety. Planting setback on local roadways is a recommended minimum of one (1) metre from the road edge. Whilst all other roads have a recommended setback distance of 2.5 metres.

Strict adherence to these guidelines, together with the spatial allocations in road reserves for trees specified by SOC, would restrict opportunity for street tree planting throughout much of the City. The implementation of street tree planting will need to be reviewed in consultation with Council's traffic engineers and the RMS (formerly RTA) to ensure an acceptable and appropriate level of safety is maintained.

Street tree selection must also take into account the required clearances for sight lines and vertical clearance for vehicular access. The required clearance varies depending upon traffic volumes and vehicle types predominantly using each roadway, e.g. State Transit Authority (STA) bus routes and arterial roads require greater vertical clearance than local roads. Trees with a single trunk and upright branching structure, with a round or elliptical crown, are best suited to crown lifting.

Landscape Guideline (RTA, 2008)

These guidelines assisting in determining the appropriate clear zones verges. Recommendations are outlined by the RTA on safe sight distances between objects (including trees) and intersections to enable a driver to observe, react and stop their vehicle.

The guideline provides the following recommendations for clearances based on the design speed of the roadway.

Design Speed	Clear Zone*
(85th percentile) [km/h]	(Metres from the edge of the travel lane)
60 or less	3
80	5
100	9
110	11

Table TP.01 - Landscape Guideline (RTA, 2008)

*N.B. Clear Zone calculation is based on a relatively flat verge. Consult Landscape Guideline (RTA, 2008) to determine appropriate clear zones for sloping verges.

PLANT STOCK SELECTION

Street tree planting requires a substantial long-term investment from Council and the community. Selection of quality plant stock is imperative to ensure the best chance of survival. This will also reduce establishment time and reduce the potential for formation of growth defects (particularly in regard to branching structure and root plate).

Specifying Trees: a guide to assessment of tree quality (NATSPEC, 2003)

This is a useful guide for the specification of tree stock quality for street and park planting.

All plant stock to be purchased for street planting should comply with the NATSPEC guideline or equivalent and pre-inspection , destructive and nondestructive testing used to verify compliance. Stock size should be selected in consideration of the planting situation and the underlying soil conditions.

A standard checklist to assess the quality of plant stock has been developed to be used in conjunction with the NATSPEC guidelines. This should be undertaken at the nursery prior to purchase and prior to delivery to the site.

PLANT PROCUREMENT

Lead time for the procurement of advance plant stock is a critical element to success. Tree stock can be obtained from the commercial nurseries via the open market, however it is often difficult to source material of the desired species or cultivated variety, size or quantity required.

Early procurement of plant stock through pre-ordering and contract growing can be integrated with the annual planting program to ensure timely delivery of the correct stock and size to ensure a more successful tree planting. This method enables plant stock quality to be monitored throughout the growing process.

Procurement of stock and program delivery should enable plant stock to be installed around March and April of each year, coinciding with the highest probability of rainfall, high soil temperatures and relatively cool air temperature. This will provide faster plant establishment resulting in lower percentages of plant loss.

IN SITU SITE SOILS

The properties of soil media are structure, texture, water holding capacity and drainage characteristics and fertility.

These properties directly influence the establishment and growth of trees. Physical attributes of the soil, particularly oxygenation and water holding capacity, affect root growth and

establishment whilst chemical attributes affect the availability of nutrients for plant growth and development. Ensuring soil quality enables new trees to establish in a short time frame, reducing plant loss and costs with ongoing maintenance.

Urban soils are typically highly modified from the original soil profile, a result of compaction, disturbance and inversion (through excavation and backfilling). These are often low in organic matter and general nutrition. Successful establishment of new trees can be encouraged through soil treatment and amendment, appropriate measures for which are determined via testing of the physical and chemical attributes of the soil.

Full soil tests can be undertaken by a National Association of Testing Authorities (NATA) laboratory. Recommendations for soil amelioration and fertilising to improve the soil to an acceptable level for the growth of the tree species proposed can be acted on where appropriate.

Imported soil media should comply with the requirements set out in AS 4419-2003 Soils for Landscaping and Garden Use.

CONSTRUCTED SOILS

Constructed soil material are often recommended, particularly in civic precincts with significant areas of pavement.

Structural soils are load bearing growing media specially developed for use in tree pits under pavements. They provide acceptable physical and chemical attributes for root growth and development whilst providing structural support to overlying pavements. Structural soils are typical manufactured using an aggregate (gap-graded) with a filler material which may include a variety of materials. The aggregate provides the structural support for the pavement, whilst the filler provides a media for nutrition and moisture from plant roots. Aggregates are commercially available from soil suppliers.

STRUCTURAL SOIL COSTS

Structural soils provide many benefits for urban design and streetscape layouts, however there are costs involved with installation of structural soil. The two main types used in Sydney are the gap graded structural soil mix, which includes 40mm basalt aggregate (dirty rocks), and the structural soil cell system. Gap graded structural soil is sold for approximately $70-$80 per cubic metre plus delivery charges. Installation is approximately $250 per linear metre based on a project of size, such as an entire streetscape with a continuous structural soil trench. Therefore, the rate for supply and installation is approximately $320- $350 per linear metre (assuming a typical verge planting zone nominal width of 1 metre). Structural soil of this type is unable to be stored for long periods of time. An alternative procurement arrangement is the filler soil, which can be purchased separately and mixed on site using Council's resources and supplied aggregate, following strict specifications.

The use of structural soil cells is a more costly technology but far exceeds the performance of trees in gap graded structural soil. This is because the soil void is far larger, providing increased rooting volume. In urban areas and new streetscape developments, this option is preferable to achieve long term tree health objectives. Typically this system costs $500-$600 per linear metre to supply and install.

DETERMINING ADEQUATE SOIL VOLUMES

Proper growth and development of new tree stock is dependent upon adequate above and below ground space. Typically, the tree root system (below ground) is not well understood primarily because it is concealed from view. Tree roots often compete with underground services, drainage systems in addition to building and pavement foundations for valuable below ground space.

Root growth is essential for the extraction of nutrients and moisture from the soil, as well as for support and anchorage of the tree. Roots are opportunistic and will grow wherever favourable soil conditions exist, with growth most limited by available oxygen in the soil. In most soil conditions, root systems are relatively close to the surface, with the majority of roots located in the top metre of soil depth from the surface. The root system of a mature tree may reach to at least the canopy drip-line, and often two to three times the radius of the crown.

Sufficient soil volume enables a tree to draw upon moisture to perform normal growth functions in between periods of natural rainfall to survive maturity. Insufficient soil moisture causes stress, and severe moisture stress leads to decline and eventual death. In cases where sufficient soil volume cannot be achieved, the water demands of plants may be supplemented by irrigation.

In order to reduce potential for moisture stress, species selection must be based on the appropriateness to the prevailing site conditions. Verges (or medians) have varied width, and the ultimate size of the tree must be proportionate to this width, as the narrower the verge the more limited the available soil volume. Large trees placed in narrow verges markedly increase the risk of infrastructure damage and reduce the long term success of the planting.

There are numerous methods for calculating adequate soil volumes, most based on general 'rules of thumb'. More scientific methodologies consider the moisture demands of the tree based on its 'crop factor' (evapotranspiration demand), overall size (usually its 'crown projection' [the area of the crown projected to the ground plane) and the climate of the area (evaporation compared with rainfall).

The following soil volumes are recommended for this climatic zone by Lindsey and Bassuk (1991):

Moisture is extracted from large pores (voids) in the soil from rainfall that has infiltrated through the soil surface. Excess moisture drains through the soil profile. Most of the moisture extracted by the tree, essential for its growth and development, is lost to evapotranspiration. A tree can be sustained on a very small volume of soil (in a nursery container for example) provided that frequent and adequate water is provided. However, in a street situation, where the tree must rely on the infiltration of natural rainfall to the root zone, tree growth and development is limited by the volume and moisture holding capacity of the soil.

In order to provide trees of a reasonable size and scale within the streetscape at maturity, consideration must be given to their essential requirements for growth and development. The ultimate size of a tree is governed by its genetic make-up and prevailing environmental conditions to a certain extent, but also by the quality and quantity of growing media (natural or artificial soil) available for root growth and development.

OBJECTIVES	TECHNOLOGIES
Increase usable soil root volumes to maximise tree growth	Street kerb extensions and blisters. Use of structural soil tree pits where possible
Increase opportunities for gaseous exchange of water and oxygen to maximise tree growth	Use of porous or permeable pavements over structural soil
Reduce conflicts between tree growth and provide free pedestrian access	Use of porous or permeable pavements over structural soil
Enable opportunities for passive irrigation in the street from stormwater drainage	Use of tree pit kerb inlets, biofiltration pits, and swales

Table TP.02 - Soil Volumes for Tree Sizes

The level of oxygen in soils is a equally important limiting factor for root growth in soils. In clay loam soils, the availability of oxygen depletes exponentially in depth below the surface. For good root growth and function, the oxygen level in soils must be at least 15%. Below 5%, root growth ceases. As root growth is limited by available oxygen, and oxygen depletes with depth, there is no benefit in increasing soil volume by increasing the depth of the planting pit. Beyond a depth of 600mm, there is greater benefit increasing the soil volume laterally.

The conditions required for good root growth and development is almost diametrically opposed to the conditions required for urban infrastructure. The street environment is possibly the least favourable situation for trees. Soil quality is usually poor, soil volumes available for root growth are low, compacted sub-grades exclude oxygen from the soil profile, there is little or no nutrient cycling, hard surfacing reduces percolation of rainfall to the soil profile and diverts run-off to the stormwater system, drainage is often poor and underground services limit the available soil volume.

In order to provide reasonable conditions for tree growth and enable trees to reach their intended mature dimensions, some compromise is necessary between the conflicting needs of the street tree and urban infrastructure. Whilst tree growth and survival can be improved by selecting trees that are highly tolerant of the street environment, there are few if any trees that perform well under these circumstances. Various innovations have been developed that reduce the potential conflict in requirements between trees and urban infrastructure. These include:

- Porous and permeable pavements and sub-base materials.
- Skeletal (structural) soils (providing load bearing sub-base for pavements).
- Drainage technologies.
- Interconnected tree pits.
- Separation of service corridors.
- Alternative street layout (to increase soil volumes).

This parking space in Victoria Park has been reserved for tree planting. The tree hole is filled with structural soil (shown) and the tree hole will be excavated for better soil. The structural soil extends under the bitumen adjacent in the car space. This is a minimum soil volume required for a small to medium sized tree, in this case a *Syzigium tiernianum*.

As an alternative to the basalt gap graded structural soil, there are some proprietary systems such as Citygreen that rely on plastic high density grates to support the soil.

USE OF FERTILISERS AND SOIL AMELIORANTS

Fertilisers and soil ameliorates should only be applied where the results of soil physical and chemical tests indicate that it is necessary. Applying fertilisers indiscriminately can lead to toxic levels of minerals in the soil and decrease the availability of essential nutrients to the plant for normal growth and development. In severe cases, this can lead to the demise of a tree, particularly species that may be sensitive to some elements such as the sensitivity to Phosphorus of Proteaceae tree species.

PLANTING

The planting technique used will vary depending on the type of container used in nursery stock production and the soil conditions at the site. The soil volume available to the tree is critical to its long term growth and establishment. Without adequate soil volume, the tree will not reach its full potential and may be stunted or die prematurely.

The quality of soil, its volume, moisture holding capacity and drainage conditions are critical to the success of tree establishment. As most tree roots are confined to the top metre or so of soil, there is little benefit in providing deep planting pits. A broad area free of obstructions to lateral root growth is ideal. Where soil volumes are limited by structures, pavements or underground services, various options may be available to increase soil volumes to the desirable minimum levels.

TREE SUPPLY SPECIFICATIONS

The City of Ryde requires all stock that shall be planted to be of top quality and grown to source from NATSPEC specified growers. This will ensure that the trees planted will perform well in a particular location and have greater chance at adapting to the harsh conditions associated with public verges.

The following are the City of Ryde's tree supply requirements:

- All tree stock must be true to type.
- Trees must be clearly labelled at the time of delivery for inspection purposes.
- No substitutes shall be made unless approved by the Project Coordinator is given in writing.
- At the time of delivery, tree stock must display good health and condition.
- Foliage size, texture and colour must be consistent with the size, texture and colour displayed by a healthy specimen of the species selected for planting.
- Trees shall not exhibit signs of having been stressed at any stage during their structural or root development due to inadequate watering, excessive sunlight or shading damage.
- Trees shall be vigorous, well established and shall be self supporting.
- Trees must not be soft or have been forced in their final growth stages at the nursery.
- Extension growth must be consistent with that of a vigorous specimen of the same species selected for planting.
- Tree shall be well developed, with straight single stem development.
- Trees shall have good branch formation and shall not exhibit signs of restricted growth from nursery rows.
- Trees must not be wounded or damaged during the planting or maintenance stages.

- The root system must be evenly balanced in relation to the tree size.
- Trees shall have been grown in their final container size for not less than twelve (12) weeks prior to the planting date.
- The tree root system shall not be root bound and roots must not be girdled.
- The root ball must be free from pests, diseases and weeds at the time of planting.
- A sample of trees shall be destructed to ensure that the trees meet the above listed criteria
- Should more than three (3) trees of any delivery do not meet the above listed criteria, the entire delivery may be refused and returned to the supplier at the cost to the supplier
- Trees that are greater than 75L in size must have the north point indicated to ensure correct orientation when planting

MULCHES

The use of wood chip mulch, either in concentric 'rings' or mass areas, is beneficial to young trees in two ways. Firstly, mulches and can reduce damage to woody surface roots and the main stem by eliminating the need for close mowing and line trimming around the stem of the tree. The less injury that occurs, the less potential there will be for entry of fungal pathogens and disease that can result in structural defects, long-term decline and eventual demise. Secondly, mulch rings aid in rapid establishment of young trees by reducing competition with weed growth and reducing moisture demand and therefore moisture stress on newly planted trees.

Where possible, partly decomposed (composted) organic materials should be used in preference to newly shredded mulch materials, such as shredded green waste from tree pruning operations. Partially composed mulches break down relatively quickly, but will improve soil quality. Mulches used for this purpose should be supplied in accordance with *AS 4454-2003 (Compost Soil Conditioners and Mulches)*. The mulch must be free of weed propagules and disease pathogens.

A cautionary approach to mulches is advised. Mulches placed too thickly over the soil surface can lead to increased surface roots growing through the mulch. These can be susceptible to damage if the mulch is displaced, or if herbicides such as Glyphosate are used to control weed growth in mulches areas. If mulch rings are adopted as a treatment method, mulch should be partially composted or aged wood chip or leaf mulch and not placed to a depth of more than 50-70mm. Care should be taken when using herbicides within mulch rings, not to use excessive concentrations or quantities that wet the surface of the mulch to minimise the potential for translocation through fine surface roots.

Maintained and permanent mulch rings should be in place for all street tree plantings.

PROTECTIVE BARRIERS AND TREE GUARDS

Whilst Stakes and ties are not generally recommended to provide artificial support during establishment, protection of young trees is often required to minimise damage otherwise caused by grass cutting equipment, particularly line trimmers. Line trimmers (brush cutters and 'whipper snippers') can cause significant damage to the vascular tissue of young and mature trees, sometimes resulting in complete ringbarking or creating injuries that lead to fungal infection or borer attack. This type of injury can lead to the death of the tree. Trees may also need protection from vandalism in public areas.

Tree guards are sometimes used to protect trees from accidental damage or vandalism in urban areas. A considerable variety of styles and designs are commercially available plus a myriad of custom made types are used. If Tree guards are required, the design should allow for easy removal of the guard once the tree is of sufficient size to no longer require protection. Segmented types that can be disassembled from around the tree are preferable to single piece structures. A minimum intrusion to the ground plane should also be considered as footing for tree guards can form an obstruction to

root growth and use valuable root volume

Tree guards are useful to protect newly planted trees from grass cutting and vandalism. A simple and effective system is to install three steel star pickets surrounded by 2mm gauge galvanised weldmesh to form a protective cylinder around the tree.

A number of physical barriers are available on the market (including the ArborGard Trunk Protector) that can be coiled or strapped around the lower trunk of small diameter trees to provide physical protection from line trimmers. These expand as the trunk grows so as not to constrict the growth of the trunk as it increases in diameter.

A commonly used tree guard at the City of Ryde

ESTABLISHMENT MAINTENANCE

To ensure the best possible outcome and to ensure proper establishment, new trees should have high level maintenance for the first two (2) growing seasons following planting.

Council should actively community with local residents to support the establishment of recently planting trees. This will not only provide long term savings in maintenance costs but also encourage a sense of ownership of the community

WATERING

Newly planted trees should be deep watered at the time of planting and subsequently watered at least once a week in spring, summer and autumn or every month if planted in winter. Water saving gel or crystals, or Terracottem may be used to increase the water holding capacity of the soil. As weather conditions and rainfall can vary significantly, regular monitoring of soil moisture levels by an experienced arborist or horticulturist should be undertaken to ensure optimum soil moisture levels. During the first year of establishment, the soil around the tree should be maintained in a moist, but not wet condition and trees should be regularly monitored for signs of moisture stress. Typically this includes drooping or wilting foliage or even partial defoliation and dieback (death of foliage and branchlets). The use of mulches will minimise watering frequency.

As a general guideline, where there is little or no rainfall, each tree should be watered with a minimum of 10 litres of water per week during the warmer months during the first year of establishment. Care should be taken to ensure that the rootball is wetted during watering rather than the surrounding soil, as the rootball often dries faster than the surrounding soil. Even when ground conditions surrounding a newly planted tree are damp, the rootball can dry out faster, until such time as new root growth generates.

Tree Size	Fortnightly irrigation	Monthly irrigation	No irrigation
Large trees (16 metres in diameter at maturity)	101 m^3	203 m^3	591 m^3
Medium Trees (8 metre canopy diameter at maturity)	25 m^3	51 m^3	149 m^3
Small Trees (4 metre canopy diameter at maturity)	6 m^3	13 m^3	37 m^3

Table TP.03 - Tree Supply Requirements

MONITORING AND INSPECTION

Trees should be inspected regularly at minimum twice during growing seasons (spring, summer and autumn months) and once during the winter months. The trees should be inspected for any signs of pest or disease infestation, irregular growth patterns, soil moisture levels, signs of moisture stress, mulch levels and adjustment of stakes and ties and corrective action taken where required. All inspections should be undertaken by a qualified arborist or horticulturist.

REPLENISHING MULCH

Organic mulch materials, such as woodchip and leaf mulch eventually decompose. Maintaining an adequate layer of mulch will promote faster plant establishment, minimise moisture stress and reduce weed competition, which in turn reduces watering and weed control frequency and therefore reduces maintenance costs. Organic mulches should be maintained at a thickness of 75mm. Too much mulch can be damaging to the tree by forming a thatch layer which resists moisture penetration. For young trees the mulch layer should be maintained to the full extent of the planting pit, or a minimum of 0.5 metres radius from the plant stem. Organic mulches should not be placed in direct contact with the plant stem. As mulches begin to degrade and thin-out, they should be replenished to ensure an even 75mm thickness.

FERTILISING

Trees should be fertilised once a year in early spring with a balanced slow release fertiliser. A balanced fertiliser contains all the essential macro-nutrients (nitrogen, potassium and phosphorus) for plant growth. It should be noted that some native species are sensitive to high levels of phosphorus. Special formulations containing low phosphorus levels are also available. Slow-release fertilisers use special technology to release nutrients to the plant over a prolonged period of time (usually 2-4 months). This minimises application frequency and avoids foliar burn that can occur if high doses of mineral salts are released to the soil within a short time frame.

WEED CONTROL

The maintenance of mulch cover will minimise weed competition. However, weed control may be required periodically around the base of the tree to minimise competition. Most herbaceous weeds and grasses can be controlled using non-selective herbicides containing the active constituent Glyphosate sprayed directly onto the weeds. As this herbicide is non-selective, great care needs to be taken to avoid spray drift onto the foliage of young trees. Spray hoods placed over the spray wand can reduce drift, but treatment should be avoided in windy conditions and should not be undertaken when rainfall is forecast within the ensuing 24 hours.

Care should be taken to use the minimum recommended rates, as excessive rates of application can percolate into the soil or mulch where there can be a high occupancy of fine roots.

The herbicide can then be absorbed by the tree roots resulting in plant death. Care should also be taken with the use of selective herbicides used to control broadleaved weeds and bindii in turf areas surrounding trees, particularly those with the active constituent Dicamba. Some of these herbicides are very toxic to trees and repeated applications can result in tree decline and death.

FORMATIVE PRUNING

Young trees often develop growth defects and other problems in the early stages of their development that can lead to more significant problems at maturity. If corrected early through an appropriate level of monitoring and treatment, most growth defects can be removed to create structurally sound trees in the long term. Without remedial action, some growth defects can lead to long term problems, resulting in potential hazards, leading to greater maintenance costs, higher risk and potential liabilities.

Formative pruning is the selective pruning of a young tree to promote good form and branching structure typical of the natural growth habit of the species. The main aim of formative pruning is to identify and remove any growth defects or other problems early in the development of the tree that may have long term implications for the trees structural integrity. Formative pruning promotes an acceptable branching habit that will enable management of pedestrian, vehicular and power line clearances over the longer term, and avoids regular intervention and physical damage to trees later in the life of the tree. Formative pruning is a long-term investment. Initial costs associated with formative pruning will be offset against potentially greater future costs associated with removing larger portions or entire trees that become dangerous due to defects.

Formative pruning is most critical in the early stages of growth of a tree, in particular the first five to ten years. Regular inspections should be conducted by a qualified arborist to ensure that potential defects are detected early in time for appropriate remedial treatment. As a minimum, inspections should be carried out on newly planted trees every twelve (12) months.

Improper pruning practices can damage and injure trees, resulting in hazards and premature decline. Proper pruning practice involves the careful removal or shortening of branches where required without causing damage to the tree or increasing the risk of disease or pest infestation. Proper pruning practices extend the Safe Useful Life Expectancy (SULE) of trees and reduce hazards. Proper pruning requires a good knowledge of tree anatomy and should only be carried out by a skilled and experienced tree surgeon. Australian Standard 4373:2007 “Pruning of Amenity Trees” sets out guidelines for the proper pruning of trees and is a useful guideline in preparation of tree pruning and maintenance specifications and ensuring quality control. Pruning may be required to remove defects and dead, dying and diseased branches to improve the health, structure and safety of a tree. The NSW WorkCover Authority has also produced a *Code of Practice for the Amenity Tree Industry* (1998) which can be specified to ensure works are carried out to acceptable safety standards in accordance with current best practice.

CROWN-LIFTING

Removing the lower branches of trees, known as ‘crown-lifting’, is often required to provide adequate clearance for pedestrians. Care should be taken to ensure that no more than one third (proportionate to the overall height) of the branches are removed at any one time. This may require small amounts of pruning to be undertaken progressively as the tree grows and matures.

PEST AND PATHOGEN RISK

Pest and diseases are a component of the urban landscape. While the City of Ryde will focus on prevention through appropriate tree selection, planting and tree maintenance Council recognises that control measures will be required at times to maintain sustained health in the Urban Forest

When selecting tree species for The City of Ryde's streets all efforts should be made to select species that are known to be pest and disease resistant.

There will be situations where the existing street tree species may be under threat but their ongoing use is imperative considering the landscape character or cultural importance they represent.

It is not possible to select a palette of tree species for urban streets that are immune from potential infestation from pathogens, particularly when some potential threats could impact on entire plant families such as Myrtaceae (*Eucalyptus spp., Corymbia spp., Callistemon spp., Melalueca spp., Tristaniopsis spp., and Lophostemon confertus*).

POTENTIAL PATHOGENS AND PESTS THAT MAY AFFECT TREES WITHIN THE CITY OF RYDE		
PATHOGEN	SPECIES AFFECTED	COMMENT
Winter Bronzing (*Thaumasticoris*)	Eucalyptus scoparia and E. nicholii. Browning of leaves during winter months, causing partial defoliation of species.	Chemicals such as Imidacloprid are available on the market to control pest, trees normally unable to sustain long periods of infestation typical result is death of specimen.
Eucalyptus rust or guava rust *(Puccina psidii)*	A very wide host range in the plant family Myrtaceae. The disease is particularly severe on susceptible eucalypt seedlings, cuttings, young trees, coppiced or damaged mature trees.	Highly susceptible trees may be grossly malformed or even killed. Growth rates of infected trees are diminished. It is currently not present in Australia, but is likely to be in time.
Myrtle rust (*Uredo rangelii)*	A very wide host range in the plant family Myrtaceae. Myrtle rust produces lesions on young, actively growing leaves and shoots as well as on fruits and sepals. Leaves may become buckled or twisted as a result of infection.	Closely related to Eucalyptus rust. Myrtle rust typically attacks young plants and new growth on established plants. Can be controlled in commercial operations with the use of fungicides. Species highly susceptible have not been included in the STM.
Dutch Elm Disease (*Ophiostoma ulmi (Buism.) Nannf., Ophiostoma novo-ulmi)*	Ulmus spp., Asian elms more resistant.	Australia does not have Dutch Elm Disease (DED), however Elm population needs to be constantly monitored for this disease. Very few Ulmus in the Ryde LGA apart from some Ulmus parvifolia.
Brushtail Possums	A range of native and exotic tree species.	Possums, flying foxes and other native animals are protected species under the *Wildlife Act 1975*. Possums are not a major problem in Ryde however elsewhere they can be a significant issue.

Table TP.04 - Pests and Pathogens within the City of Ryde

A number of approaches will help minimise the impact of pests and disease on the Urban Forest. These include the monitoring of the Urban Forest and including the involvement of the Department of Primary Industries, ensuring the general health and vitality of Urban Forest, providing greater diversity, building a database of pest and disease, making sure of hygiene controls during maintenance, and ensuring good communication and working links with bordering Councils.

At the tree implementation stage, pests and diseases can rapidly cause the decline and death of new trees if not kept in check. Most pest infestations on young trees are relatively minor and can be controlled by hand removal of insects, or small applications of Pyrethrin or white oil. Pyrethrin is a natural (plant based) insecticide which works on contact with the insect.

Some insects that produce protective coverings, such as scale or lerps, may require systemic pesticide applications, normally applied by foliar spray. Minor insect infestations rarely cause significant damage and can be largely ignored.

EXISTING PATHOGENS AND PESTS AFFECTING TREES WITHIN THE CITY OF MELBOURNE		
PATHOGEN	SPECIES AFFECTED	COMMENT
Armillaria luteobubalina	A soil-borne fungus that causes root rot in a wide variety of plants including many native plants and introduced ornamental plants.	At present there is no one simple method for controlling Armillaria. A combination of sanitation measures, good horticultural management and the addition of organic matter to soils can be expected to retard the activity of Armillaria.
Fusarium Wilt (Fusarium oxysporum f.sp. canariensis)	Phoenix spp., Washingtonia filifera.	Management is dependent upon rapid and accurate diagnosis. Once correctly diagnosed appropriate management can be implemented.
Fig Psyllid (Mycopsylla fici)	Periodic defoliation of Moreton Bay Fig trees (Ficus macrophylla).	Ficus macrophylla is avoided in preference of other native figs such as F rubiginosa.
Phytophthora cinnamomi	Causes root rot of a wide variety of plant species including many native plants and introduced plants.	Implement model of national best practice guidelines for management (http://www.environment.gov.au/biodiversity/invasive/publications/p-cinnamomi.html).
Lilly Pilly Psyllid (Trioza spp.)	Cardiaspina cause the most damage to Syzigium species, particularly S australe and S australe 'Blaze', S paniculatum and Waterhousia floribunda to a lesser extent.	Outbreaks occur periodically.and often in dry weather on water stressed plants. Develop integrated program for badly infested trees; monitor, cultural and chemical (imidacloprid stem or soil inject).
Brown Root Rot (Phellinus noxious)	The fungus attacks tree roots causing decay, which cuts off water and nutrient supply to the crown resulting in tree death. Wilting followed by often rapid death in young trees. In older trees, leaves turn chlorotic gradually, the crown thins and the tree eventually dies Can affect palms, figs and Hoop Pines.	Remove the entire infected tree and as much roots as possible. Install root barriers around the infected site to reduce the rate of spread.

STREET TREE STANDARD PLANTING DETAILS

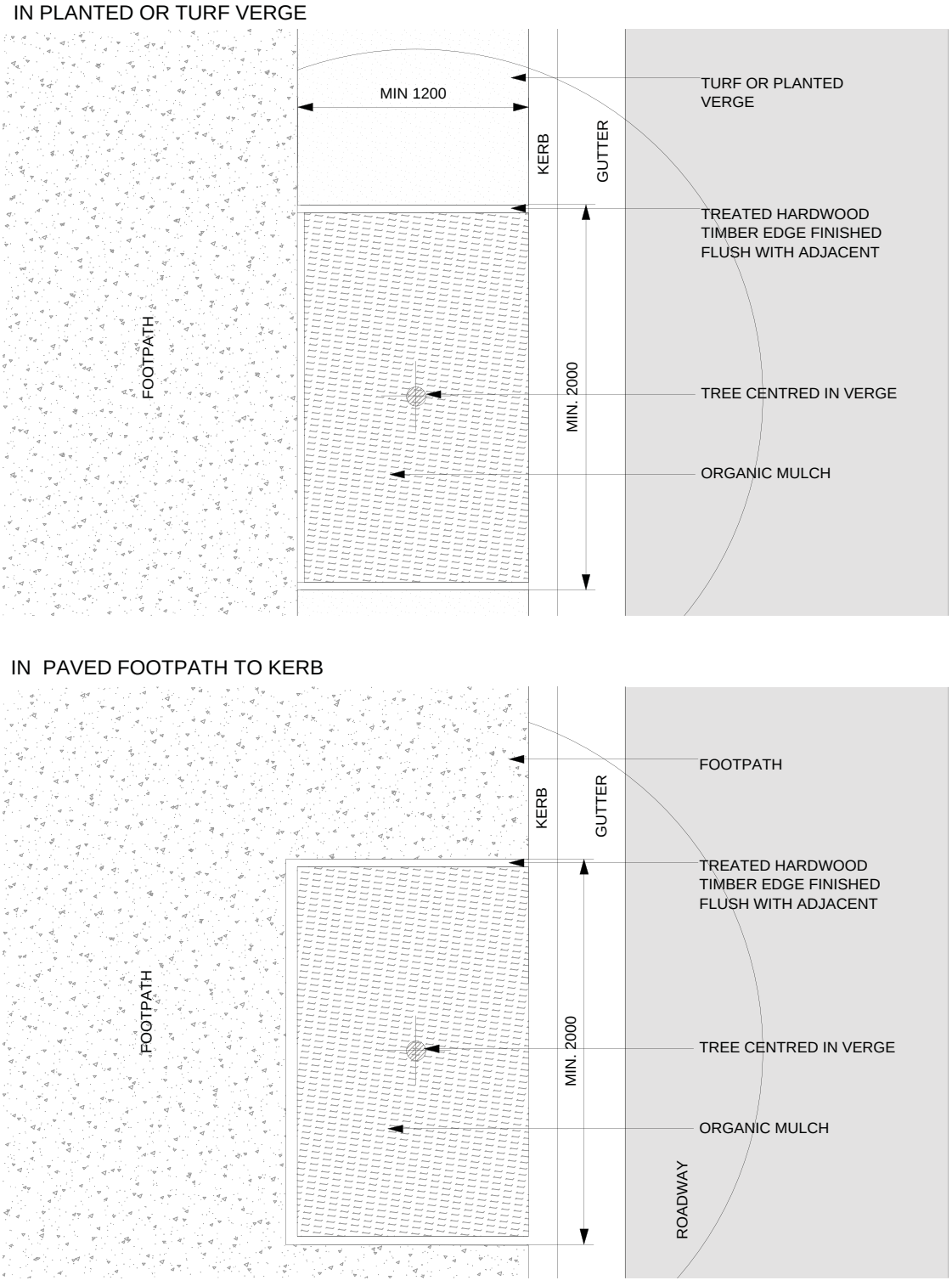


Figure TP.01 - Tree Planting in Footpath - Plans

Scale: 1:25 @ A4

STREET TREE STANDARD PLANTING DETAILS

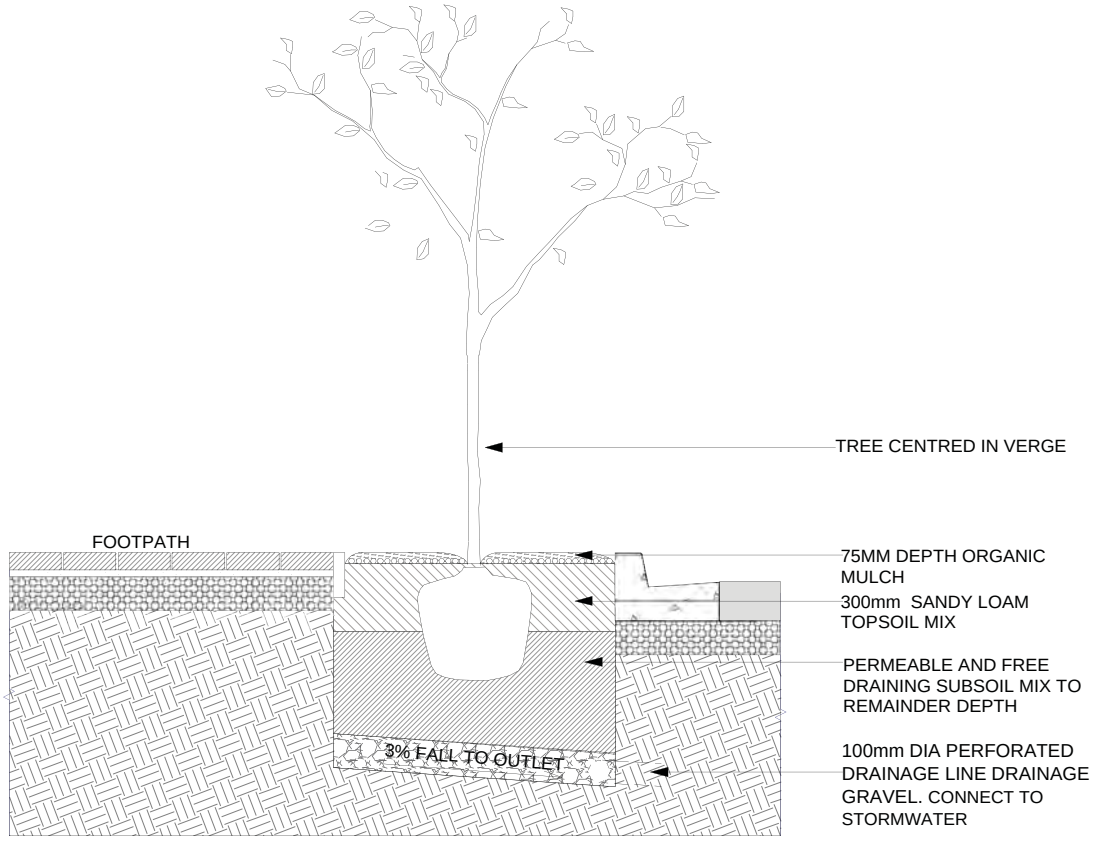
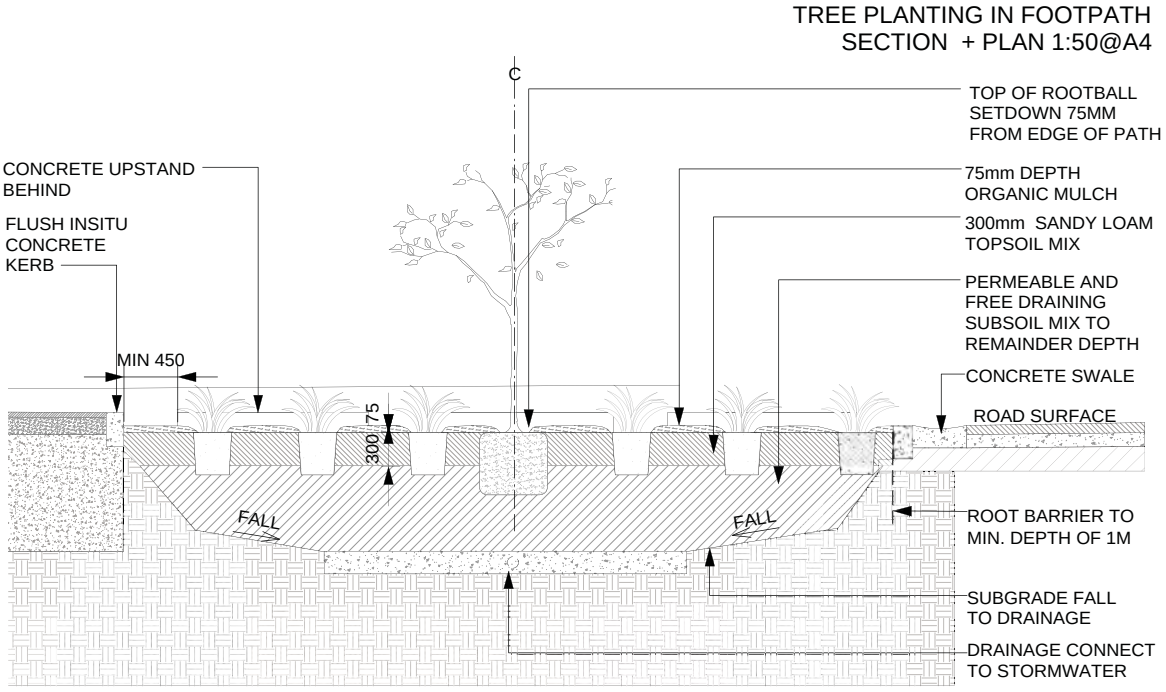


Figure TP.02 - Tree Planting in Footpath - Section

Scale: 1:25 @ A4

STREET TREE STANDARD PLANTING DETAILS



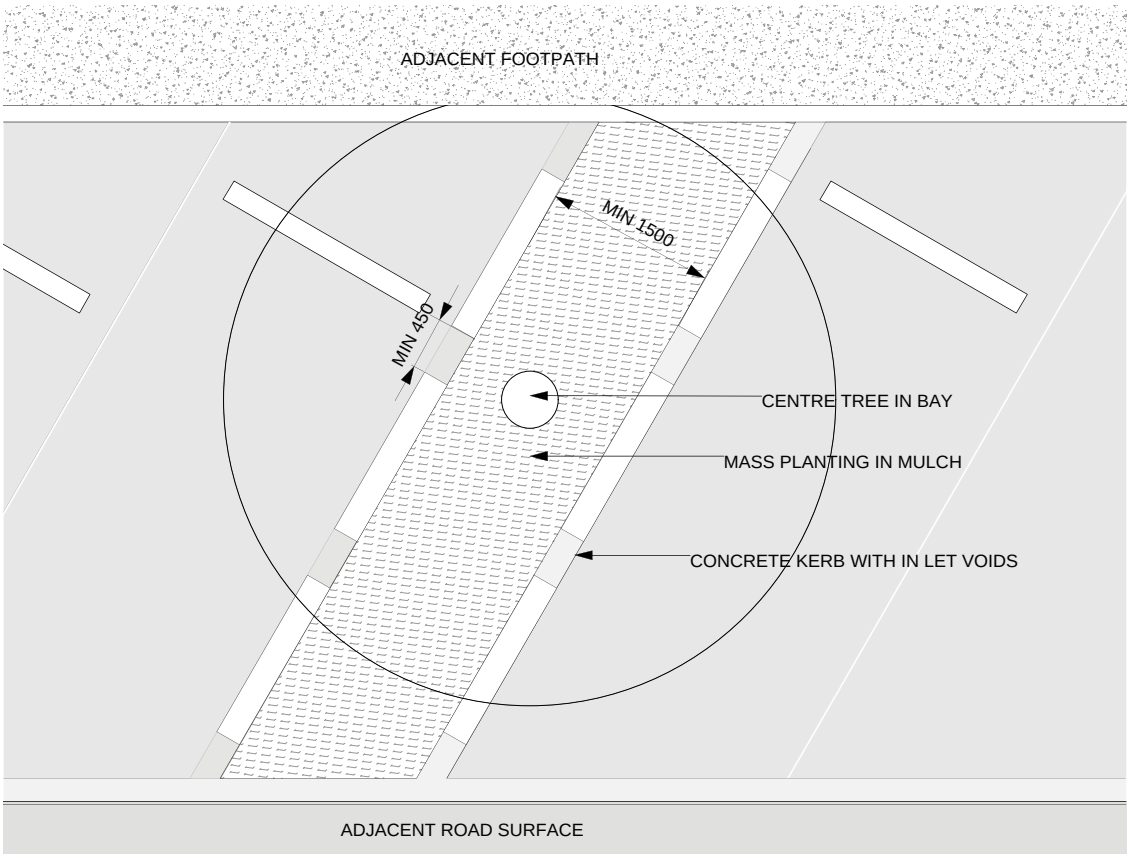


Figure TP.03 - Tree Planting in Footpath - Section + Plan

Scale: 1:50 @ A4

STREET TREE STANDARD PLANTING DETAILS

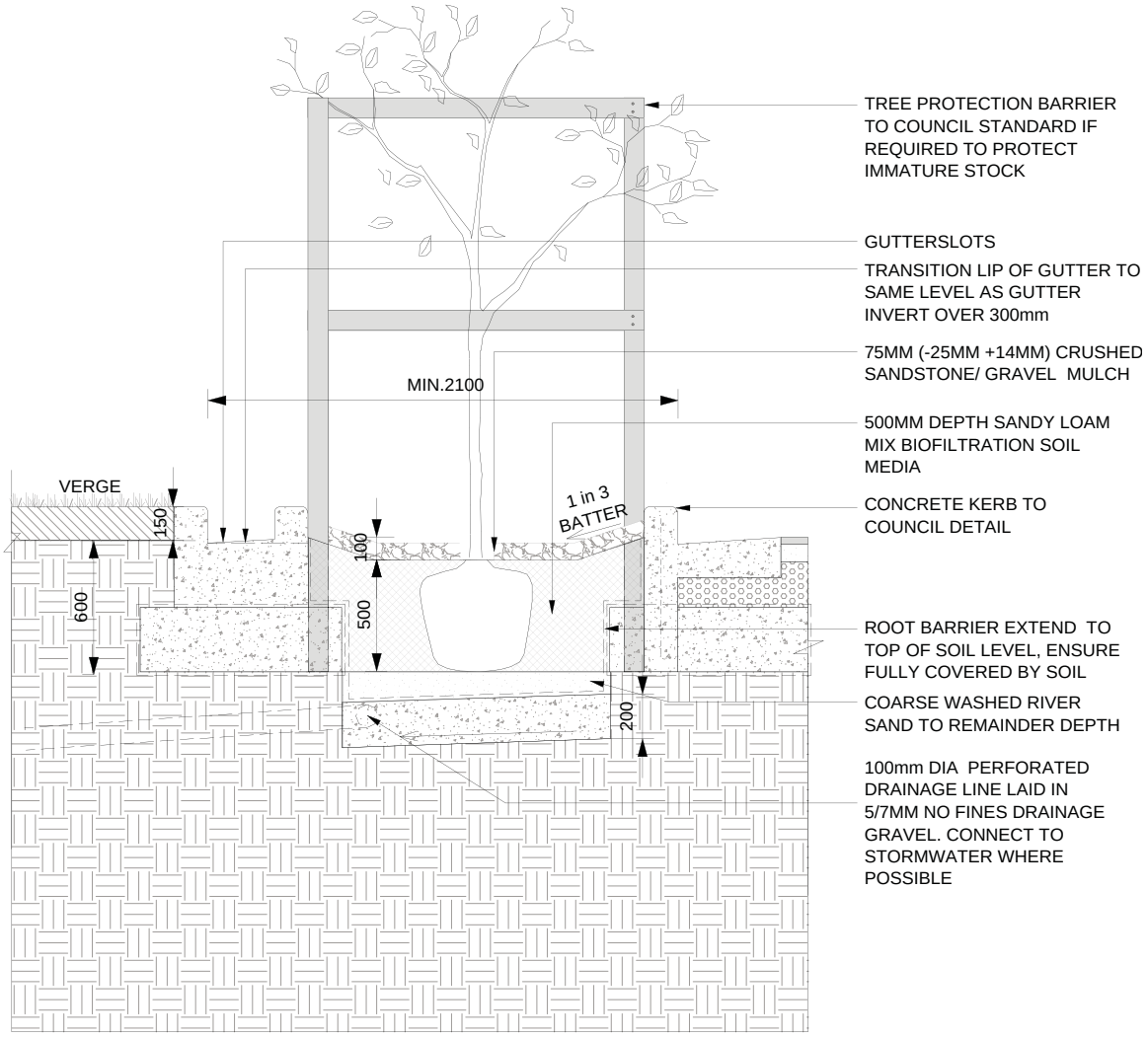


Figure TP.04 - Tree Planting in Raingarden - Section

Scale: 1:25 @ A4

STREET TREE STANDARD PLANTING DETAILS

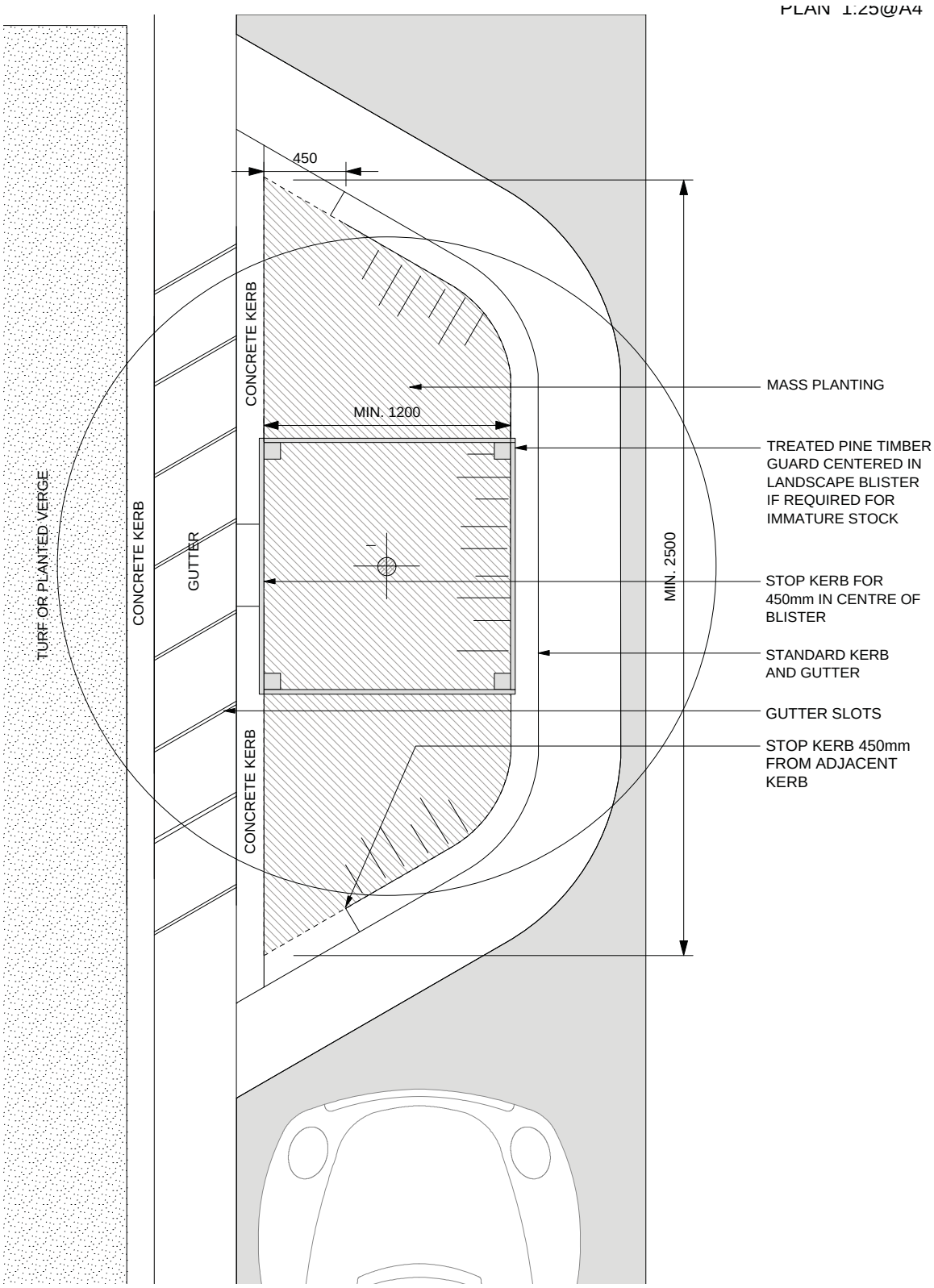


Figure TP.05 - Tree Planting in Raingarden - Plan

Scale: 1:25 @ A4

STREET TREE STANDARD PLANTING DETAILS

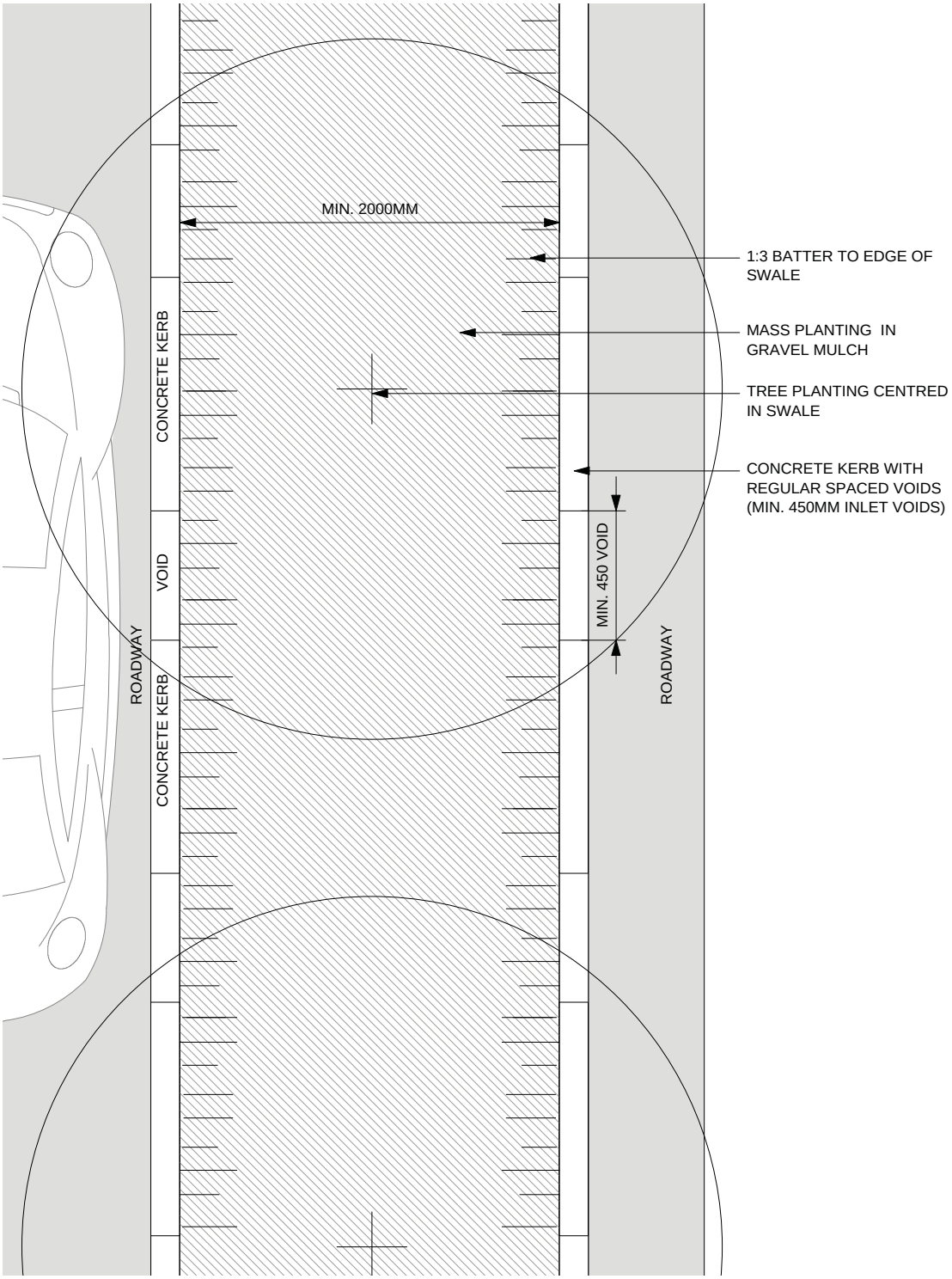


Figure TP.06 - Tree Planting in Central Swale - Plan

Scale: 1:25 @ A4

STREET TREE STANDARD PLANTING DETAILS

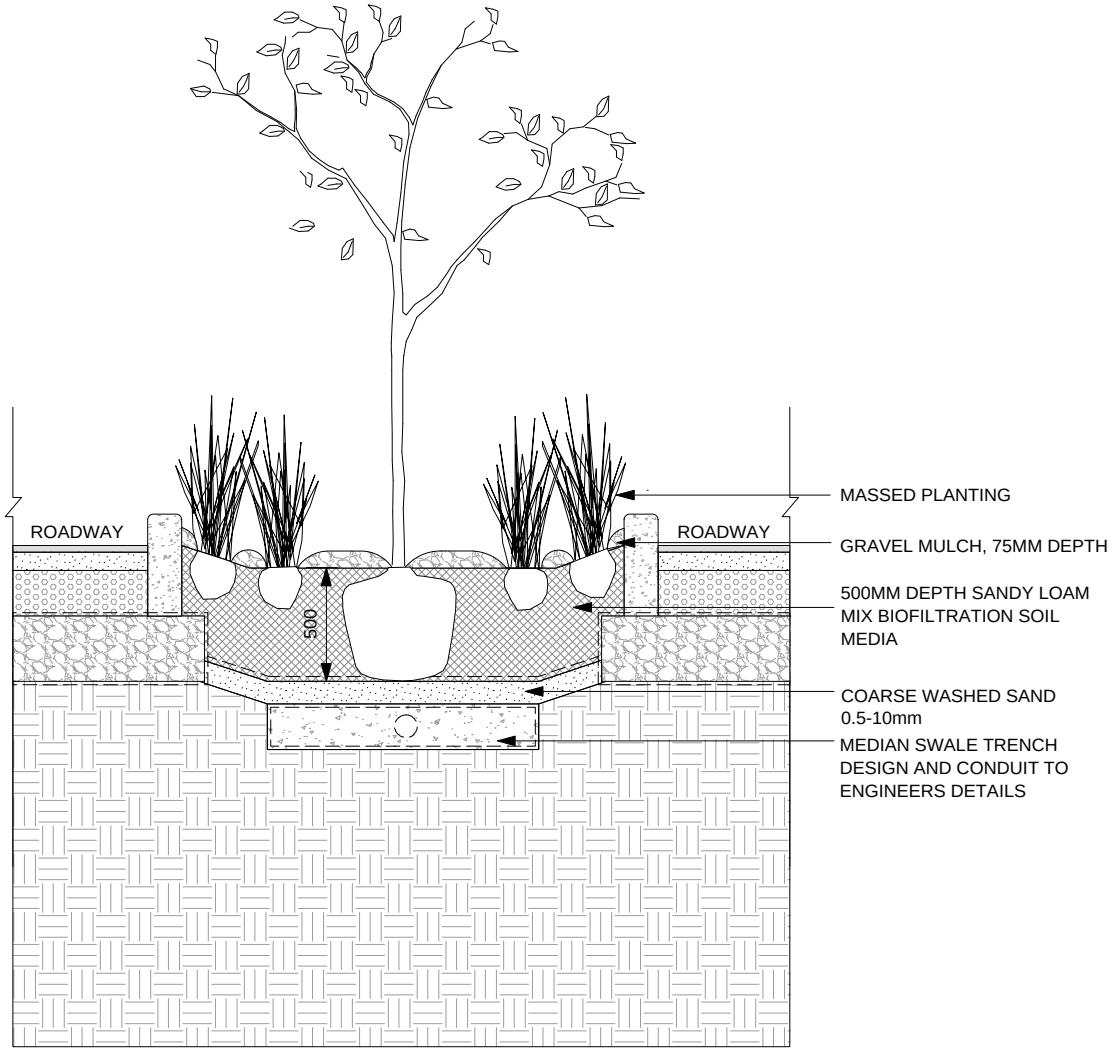


Figure TP.07 - Tree Planting in Central Swale - Section

Scale: 1:25 @ A4

Definitions

Aerial Bundle Conductor (ABC)

A type of overhead low voltage electrical cable. Insulated cables are wrapped around a steel cable strung between overhead poles. This minimises the risk of open conductors touching and reduces the clearances for pruning around trees.

Amenity

The quality of being pleasant or attractive, having desirable or useful features and making a contribution to physical or material comfort.

Australian Qualification Framework (AQF)

A quality assured national framework for education and training. It provides nationally recognised and endorsed qualifications through a competency based training system.

Canopy

The crown of a tree, comprising all of the foliage and branches.

Canopy drip-line

The extent of the canopy projected to the ground plane.

Deciduous

A plant that sheds all of its leaves at one time during the year.

Decline

The progressive degeneration of the health of a tree.

Development Application

A request for permission to carry-out proposed development.

Exotic (species)

An introduced species, not native to the Australian Continent.

Formative pruning

The selective pruning of a young tree to promote good form and branching structure typical of the natural growth habit of the species. The main aim of formative pruning is to identify and remove any growth defects or other structural problems that may have long term implications early in the development of the tree.

Habit

The nature and appearance of the branching framework of a tree or plant.

Hazard

A situation or source of danger or risk that poses a level of threat to life, health property or environment.

Heritage Conservation Area

An area which has distinctive character of heritage significance which is desirable to conserve, as defined in the LEP.

Heritage Item

A building, work, relic, artefact, tree or place listed in a nominated Schedule of the Local Environment Plan.

Locally-indigenous (species)

A species native to the local area.

Native (species)

A species native to the Australian Continent.

Natural Target Pruning

A pruning technique that involves identifying the correct angle and alignment for proper pruning cuts by forming “targets” between the commencement of the cut at the outer edge of the Branch Bark Ridge (BBR) and the end of the cut at the point where the lower part of the branch meets the branch collar.

Noxious Weed

A plant that has been declared Noxious under the meaning of the *Noxious Weeds Act 1993*.

Nuisance Species

A plant that has one or more negative attributes, such as an extensive and damaging root system, toxic or allergenic properties.

Pruning

The selective removal of branches, severed at the branch collar near the junction with another branch in accordance with Natural Target Pruning techniques as specified in AS4373:2007.

Remove (a tree)

To cut down or sever the main stem of a tree, resulting in its destruction.

Retention Value

The relative value of a tree for preservation in the context of a proposed development, based on an evaluation of its sustainability in the landscape (SULE) weighed up against its significance in the landscape (sum of its amenity, ecological and heritage value).

Root Control Barrier

A material (usually in sheet form) inserted vertically through the soil profile to deflect root growth.

Root Plate

The conglomerate of structural (woody) and fibrous roots that radiate out from the tree trunk, often extending beyond the drip-line and usually confined to the top metre of soil.

Safe Useful Life Expectancy (SULE)

A systematic method (developed by Jeremy Barrell) of estimating the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area, less its estimated current age. The life expectancy of the tree is further modified where necessary in consideration of its current health and vigour, condition and suitability to the site.

Significant Tree

A 'Significant Tree' is any 'tree' that is either, listed as a Heritage Item, located within a property that is listed as a Heritage Item or listed on Council's Significant Tree Register or located within a Heritage Conservation Area.

Significant Tree Register

A listing of trees deemed to be Significant in accordance with Council's assessment criteria, usually based on guidelines prepared by the Heritage Council in accordance with the Burra Charter.

Soil Volume

The total amount of soil material or growing media available for unobstructed root growth.

Structural Soil

A growing media for plants consisting of a mixture of materials designed to provide load bearing capacity for pavements whilst also providing basic requirements for root growth (aeration, moisture holding capacity and nutrients).

Threatened Species

A species threatened with extinction as defined under the Threatened Species Conservation Act (NSW) 1995.

Trade Arborist

A suitably experienced person with a minimum qualification of Australian Qualification Framework (AQF) Level 3 in Arboriculture.

Tree

A perennial plant having a single stem or relatively few woody stems, including palm trees and tree ferns, whether exotic (introduced), native or locally-indigenous species.

Tree Protection Zone (TPZ)

A specified area at a given distance from the trunk set aside for the protection of a trees root system and canopy during land development works to ensure the long term viability and stability of a tree, calculated in accordance with AS 4970:2009.

Urban Forest

The Urban Forest is the conglomerate of trees growing within urban areas on public and privately owned lands, including those growing within parks, reserves, streets and institutional land.

Water Sensitive Urban Design (WSUD)

Environmentally sustainable water resource management in urban areas. The integration of water cycle management into urban planning & design, sensitive to natural ecological and hydrological cycles.

Appendices

Master Street Tree List

APPENDIX 1 - MASTER STREET TREE LIST

This list was prepared in 2012-2013 and will change over time as Council adds and removes species.

BOTANIC NAME	COMMON NAME	TYPICAL DIMENSIONS (URBAN AREAS) Height	Spread	FORM	TYPE (Deciduous / Evergreen)	LONGEVITY	HABITAT VALUE	SEASONAL INTEREST	SOIL TYPE	PRUNING FOR OVERHEAD POWERLINES	MIN SUITABLE VERGE WIDTH
Acacia falcata	Sickle Wattle	2 to 4 metres	2 to 4 metres	Irregular Rounded	E	Short 10-15 years	Native to East Coast	Small pale yellow flowers	Clay loam	Should not require pruning due to small size	2 metres
Acacia floribunda	Sally Wattle	6 to 8 metres	6 to 8 metres	Irregular Rounded	E	Short 10-15 years	Native to East Coast	Abundant pale yellow flowers	Prefers sandy alluvial soils. Adaptable.	Semi-tolerant (ABC's)	3 metres
Acacia implexa	Hickory	8 to 10 metres	6 to 8 metres	Broad elliptical	E	Short 10-15 years	Native to East Coast	Small clusters of pale yellow flowers	Prefers moist Clay loam (shale) soils. Adaptable to poorer sandy soils	Not suitable for positions beneath powerlines	3 metres
Acacia longissima	Narrow-leaf Wattle	4 to 6 metres	4 to 6 metres	Irregular Rounded	E	Short 10-15 years	Native to East Coast	Abundant pale yellow flower spikes	Sandy soils, adaptable to clay loam	Should not require pruning due to small size	4 metres
Acacia parramattensis	Sydney Green Wattle	8 to 10 metres	6 to 8 metres	Irregular Rounded	E	Short 10-15 years	Native to East Coast	Small clusters of pale yellow flowers	Clay loam (shale) and gravelly clay	Not suitable for positions beneath powerlines	3 metres
Acacia shinoides	Green Cedar Wattle	8 to 10 metres	6 to 8 metres	Irregular Rounded	E	Short 10-15 years	Native to East Coast	Small clusters of pale yellow flowers. Bronze new foliage	Clay Loams and alluvium. Adaptable to sandstone	Not suitable for positions beneath powerlines	3 metres
Acer buergeranum	Trident Maple	8 to 10 metres	6 to 8 metres	Conical to rounded	D	Moderate (40-60 Years)	Low	Yellow, orange and crimson autumn foliage	Friable clay loam adaptable to poorer class soils	Can be directionally pruned to accommodate powerlines	3 metres

BOTANIC NAME	COMMON NAME	TYPICAL DIMENSIONS (URBAN AREAS)		FORM	TYPE (Deciduous / Evergreen)	LONGEVITY	HABITAT VALUE	SEASONAL INTEREST	SOIL TYPE	PRUNING FOR OVERHEAD POWERLINES	MIN SUITABLE VERGE WIDTH
		Height	Spread								
Acer negundo 'Flamingo'	Flamingo Box Elder	10 to 12 metres	10 to 12 metres	Rounded	D	Moderate (40-60 Years)	Low	Varigated foliage with pink tinge in spring	Friable clay loam and fertile alluvial soils	Can be directionally pruned to accommodate powerlines	4 metres
Acer negundo 'Sensation'	Sensation Box Elder	12 to 14 metres	10 to 12 metres	Rounded	D	Moderate (40-60 Years)	Low	Yellow, orange and crimson autumn foliage	Friable clay loam and fertile alluvial soils	Can be directionally pruned to accommodate powerlines	4 metres
Acmena smithii	Lilly Pilly	10 to 12 metres	10 to 12 metres	Rounded	E	Long (50-80 years)	Flowers & Fruit birds bats & small mammals	White Flowers. Clusters of mauve fruits	Clay Loams. Adaptable to sand	Not suitable for positions beneath powerlines	4 metres
Acmena smithii 'Clipper'	Clipper Lillypilly	6 to 8 metres	4 to 6 metres	Elliptical to rounded	E	Moderate (40-60 Years)	Moderate	Bronze red new foliage	Clay Loams. Adaptable to sandy loam	Can be directionally pruned to accommodate powerlines	3 metres
Acmena smithii 'Red Head'	Red Head Lillypilly	6 to 8 metres	4 to 6 metres	Elliptical to rounded	E	Moderate (40-60 Years)	Moderate	Deep red new foliage	Clay Loams. Adaptable to sandy loam	Can be directionally pruned to accommodate powerlines	3 metres
Allocasuarina torulosa	Forest Oak	10 to 12 metres	6 to 8 metres	Conical	E	Moderate (40-60 Years)	High. Parrot family	Fine textured bronze foliage	Clay loam to transitional (shale/ sandstone) soils. Adaptable to sandstone	Not suitable for positions beneath powerlines	3 metres

BOTANIC NAME	COMMON NAME	TYPICAL DIMENSIONS (URBAN AREAS)		FORM	TYPE (Deciduous / Evergreen)	LONGEVITY	HABITAT VALUE	SEASONAL INTEREST	SOIL TYPE	PRUNING FOR OVERHEAD POWERLINES	MIN SUITABLE VERGE WIDTH
		Height	Spread								
Alloxylon flammeum [syn. *Oreocallis wickhamii*]	Tree Waratah	8 to 10 metres	6 to 8 metres	Elliptical	E	Moderate (40-60 Years)	Flowers & Fruit birds bats & small mammals	Prolific red flowers	Clay Loam adaptable to loamy sand & sand	Not suitable for positions beneath powerlines	3 metres
Angophora bakeri	Narrow-leaved Rough-barked Apple	10 to 12 metres	8 to 10 metres	Irregular rounded	E	Moderate (40-60 Years)	Nectar - birds bats mammals. Local species	Small pannicles of while flowers. Yellow ocre flakey bark	Sandstone soils	Not suitable for positions beneath powerlines	4 metres
Angophora costata	Sydney Red Gum	20 to 22 metres	16 to 18 metres	Irregular rounded	E	Long (50-80 years)	Nectar - birds bats mammals. Local species	Smooth reddish pink bark prolific white flowers	Sandstone & transitional (clay/ sandstone) soils	Not suitable for positions beneath powerlines	5 metres
Angophora floribunda	Rough-barked Apple	16 to 18 metres	10 to 12 metres	Irregular rounded	E	Long (50-80 years)	Local species	Light grey furrowed bark interesting form	Prefers clay loam and well drained alluvial soils. Adaptable	Not suitable for positions beneath powerlines	4 metres
Angophora hispida	Dwarf Apple	4 to 6 metres	4 to 6 metres	Irregular rounded	E	Moderate (40-60 Years)	Local species	Prolific white flowers	Prefers well drained sandstone soils	Can be directionally pruned to accommodate powerlines	3 metres
Arbutus unedo	Irish Strawberry Tree	6 to 8 metres	6 to 8 metres	Rounded	E	Long (50-80 years)	Moderate	White flowers. Small scarlet fruits	Clay Loams. Adaptable to sand	Can be directionally pruned to accommodate powerlines	3 metres

BOTANIC NAME	COMMON NAME	TYPICAL DIMENSIONS (URBAN AREAS)		FORM	TYPE (Deciduous / Evergreen)	LONGEVITY	HABITAT VALUE	SEASONAL INTEREST	SOIL TYPE	PRUNING FOR OVERHEAD POWERLINES	MIN SUITABLE VERGE WIDTH
		Height	Spread								
Backhousia citriodora	Lemon-scented Myrtle	8 to 10 metres	6 to 8 metres	Conical to elliptical	E	Long (50-80 years)	Native to East Coast	Lemon-scented foliage. White Flowers	Clay loam to sandy loam	Not suitable for positions beneath powerlines	3 metres
Backhousia myrtifolia	Grey Myrtle	10 to 12 metres	6 to 8 metres	Elliptical	E	Long (50-80 years)	Local species	Small terminal clusters of white flowers	Clay Loams & alluvial soils. Adaptable to sandstone	Not suitable for positions beneath powerlines	3 metres
Banksia integrifolia	Coast Banksia	10 to 12 metres	6 to 8 metres	Conical to elliptical	E	Moderate (40-60 Years)	Nectar birds bats mammals	Yellow flowers	Sand. Adaptable to clay loam	Not suitable for positions beneath powerlines	3 metres
Banksia serrata	Old Man Banksia	6 to 8 metres	6 to 8 metres	Irregular rounded	E	Moderate (40-60 Years)	Nectar birds bats mammals	Yellow flowers	Sand. Adaptable	Semi-tolerant (ABC's)	3 metres
Bauhinia variegata	Orchid Tree	8 to 10 metres	8 to 10 metres	Rounded	SD	Long (50-80 years)	Low	Prolific pink flowers	Loam	Semi-tolerant (ABC's)	3 metres
Brachychiton discolor	Queensland Lacebark	14 to 16 metres	10 to 12 metres	Broad elliptical	SD	Very long (80 years +)	Nectar - bird attracting	Large rosy pink bell shaped flowers	Deep clay loams & alluvial soils	Not suitable for positions beneath powerlines	4 metres
Brachychiton populneus	Kurrajong	12 to 14 metres	10 to 12 metres	Conical to elliptical	E	Very long (80 years +)	Low	Cream to pink bell shaped flowers	sand or sandy loam. Adaptable	Not suitable for positions beneath powerlines	4 metres
Buckinghamia celsissima	Ivory Curl Flower	6 to 8 metres	4 to 6 metres	Elliptical	E	Moderate (40-60 Years)	Nectar	White flowers. Bronze new foliage	Clay loam to sandy loam. Alluvial	Not suitable for positions beneath powerlines	2 metres

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Callicoma serratifolia	Callico Bush	6 to 8 metres	4 to 6 metres	Irregular rounded	E	Moderate (40-60 Years)	Local species	Small creamy white flowers. Dk green glossy foliage	Poor sandstone and alluvial soils, adaptable to clay loam	Can be directionally pruned to accommodate powerlines	3 metres
Ceratonia siliqua	Carob Bean	8 to 10 metres	8 to 10 metres	Rounded to broad domed	E	Long (50-80 years)	Low	Greenish flowers	Clay loam. Adaptable to alluvial and sandy loam	Semi-tolerant (ABC's)	4 metres
Ceratopetalum apetalum	Coachwood	10 to 12 metres	8 to 10 metres	Broad elliptical	E	Very Long (80 years +)	Moderate	White flowers with red Calyx	Sandy loam, adaptable to alluvial soils & clays	Not suitable for positions beneath powerlines	4 metres
Ceratopetalum gummiferum	(NSW Christmas ush	6 to 8 metres	4 to 6 metres	Elliptical	E	Moderate (40-60 Years)	Moderate	White flowers with red Calyx	Moderate sandy loams. Not suitable for heavy clays	Semi-tolerant (ABC's)	3 metres
Citharexylum spinosum	Fiddlewood	10 to 12 metres	10 to 12 metres	Rounded	SD	Moderate (40-60 Years)	Low	Orange foliage	Loam. Adaptable to Clay Loam and sand	Semi-tolerant (ABC's)	4 metres
Clerodendrum tomentosum	Hairy Clerodendrum	8 to 10 metres	6 to 8 metres	Irregular rounded	E	Moderate (40-60 Years)	Bird attracting (Satin Bowerbird)	Dense heads of white flowers	Rocky and sandy soils, sand dunes	Not suitable for positions beneath powerlines	3 metres
Corymbia eximia	Yellow Bloodwood	10 to 20 metres	8 to 20 metres	Broad Elliptical	E	Moderate (40-60 Years)	Nectar - birds bats mammals. Local species	Large panicles of while flower. Yellow ocre flakey bark	Sand. Adaptable	Not suitable for positions beneath powerlines	4 metres

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Corymbia gummifera	Red Bloodwood	12 to 20 metres	10 to 12 metres	Broad elliptical	E	Long (50-80 years)	High. Nectar. Resin (Gliders)	White flowers	Sandy loam. Adaptable to sand and clay	Not suitable for positions beneath powerlines	4 metres
Corymbia maculata	Spotted Gum	20 to 22 metres	14 to 16 metres	Broad Elliptical	E	Long (50-80 years)	Moderate	Smooth mottled whitish grey trunk	Clay loam to heavy clay. Tolerates well drained alluvial soils	Not suitable for positions beneath powerlines	5 metres
Cupaniopsis anacardioides	Tuckeroo	10 to 12 metres	4 to 6 metres	Rounded to broad domed	E	Moderate (40-60 Years)	Native to East Coast	Dull yellow to orange seed capsules	Sandy soils. Adaptable to clay loams	Semi-tolerant (ABC's)	3 metres
Elaeocarpus grandis	Blue Quandong	14 to 16 metres	14 to 16 metres	Broad elliptical to rounded	E	Long (50-80 years)	Moderate. Fruit Pigeons	White flowers. Large blue berries	Alluvial soils adaptable to sandy loams	Not suitable for positions beneath powerlines	5 metres
Elaeocarpus kirtonii	Pigeon-berry Ash	14 to 16 metres	14 to 16 metres	Broad elliptical to rounded	E	Long (50-80 years)	Moderate	White flowers	Alluvial soils adaptable to sandy loams	Not suitable for positions beneath powerlines	6 metres
Elaeocarpus *reticulatus*	Blueberry Ash	8 to 10 metres	4 to 6 metres	Elliptical	E	Moderate (40-60 Years)	Native to East Coast	White flowers. Blue Berries	Clay Loam to Sandy Loam. Adaptable	Not suitable for positions beneath powerlines	2 metres
Elaeodenron australe [syn. *Cassine australis*]	Red-fruited Olive Plum	6 to 8 metres	6 to 8 metres	Irregular rounded	E	Moderate (40-60 Years)	Native East Coast. Fruit Pigeons	Orange red berries	?	Not suitable for positions beneath powerlines	3 metres

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Eucalyptus acmenioides	White Mahogany	20 to 22 metres	12 to 14 metres	Irregular rounded	E	Long (50-80 years)	Nectar & pollen source birds & bees	White flowers. Rough fibrous bark	Fertile clay loam	Not suitable for positions beneath powerlines	5 metres
Eucalyptus eugenioides	Thin-leaved Stringybark	10 to 12 metres	8 to 10 metres	Irregular rounded	E	Moderate (40-60 Years)	Nectar & pollen source birds & bees	Fibrous stringy bark. White flowers	Clay loam adaptable to transitional and sandstone	Not suitable for positions beneath powerlines	4 metres
Eucalyptus fibrosa	Broad-leaved Ironbark	20 to 22 metres	12 to 14 metres	Irregular rounded	E	Long (50-80 years)	Nectar - birds bats mammals. Local species	Coarse dark grey furrowed bark	Clay loam to heavy clay. Tolerates silt and poor sandy soils	Not suitable for positions beneath powerlines	5 metres
Eucalyptus globoidea	White Stringybark)	10 to 12 metres	8 to 10 metres	Irregular rounded	E	Moderate (40-60 Years)	Local Species	Fibrous stringy bark. White flowers	Prefers dry or well drained poor sandy and gravelly soils	Not suitable for positions beneath powerlines	4 metres
Eucalyptus haemastoma	Scribbly Gum	8 to 10 metres	8 to 10 metres	Irregular rounded Mallee-like form	E	Long (50-80 years)	Local Species	Smooth whitish grey bark	Prefers dry or well drained sandstone soils	Not suitable for positions beneath powerlines	3 metres
Eucalyptus longifolia	Woollybutt	14 to 16 metres	10 to 12 metres	Irregular rounded	E	Moderate (40-60 Years)	Local to Sydney Basin. Nectar Flying Foxes	Grey flakey fibrous bark	Clay loam to heavy clay and alluvial soils on flats	Not suitable for positions beneath powerlines	4 metres

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Eucalyptus paniculata	Grey Ironbark	20 to 22 metres	12 to 14 metres	Irregular rounded	E	Long (50-80 years)	Nectar & pollen source birds & bees	Coarse dark grey furrowed bark	Prefers heavy clay and transitional soils	Not suitable for positions beneath powerlines	5 metres
Eucalyptus punctata	Grey Gum	14 to 16 metres	10 to 12 metres	Irregular rounded, variable depending on soil condition	E	Long (50-80 years)	Nectar source birds & Flying foxes. Koala food tree	Smooth grey bark with rusty orange patches	Transitional and sandstone soils	Not suitable for positions beneath powerlines	5 metres
Eucalyptus racemosa	Scribbly Gum	12 to 14 metres	8 to 10 metres	Irregular rounded, variable	E	Long (50-80 years)	Local Species	Smooth whitish grey bark	Transitional and sandstone soils	Not suitable for positions beneath powerlines	4 metres
Eucalyptus resinifera	Red Mahogany	14 to 16 metres	10 to 12 metres	Irregular rounded	E	Moderate (40-60 Years)	Nectar source birds & Flying foxes. Koala food tree	Fibrous reddish brown bark	Clay loam (shale) and transitional soils	Not suitable for positions beneath powerlines	5 metres
Eucalyptus robusta	Swamp Mahogany	14 to 16 metres	10 to 12 metres	Irregular rounded	E	Long (50-80 years)	Nectar - bird attracting. Flying Fox. Arboreal mammals	Furrowed reddish brown spongy bark	Prefers swampy alluvial soils and sand adaptable to clay loams	Not suitable for positions beneath powerlines	5 metres
Eucalyptus sclerophylla	Hard-leaved Stringybark	8 to 10 metres	8 to 10 metres	Irregular rounded Mallee-like form	E	Long (50-80 years)	Moderate - Locally-indigenous	Smooth whitish grey bark	Deep alluvial sands to shallow sandstone soils	Not suitable for positions beneath powerlines	4 metres

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Eucalyptus sideroxylon	Mugga Ironbark	Up to 25 metres	10 to 12 metres	Irregular rounded or elliptical	E	Moderate (40-60 Years)	Moderate	Rough furrowed black bark. Glaucous green foliage	Prefers dry gravely and granite soils on dry ridges. Adaptable	Not suitable for positions beneath powerlines	4 metres
Eucalyptus tereticornis	Forest Red Gum	18 to 20 metres	14 to 16 metres	Irregular broad elliptical	E	Long (50-80 years)	Moderate (hollow forming with age)	Smooth mottle grey - bluish bark	Clay Loams and alluvial soils. Adaptable to sandstone	Not suitable for positions beneath powerlines	5 metres
Flindersia australis	Crows Foot Ash	16 to 18 metres	10 to 12 metres	Broad elliptical	E	Long (50-80 years)	Native	Dense glossy foliage	Clay loam & alluvial soils, adaptable to sandy loams	Not suitable for positions beneath powerlines	5 metres
Franklinia axillaris [syn.Gordonia axillaris] (Gordonia)	Gordonia	6 to 8 metres	6 to 8 metres	Rounded	E	Long (50-80 years)	Moderate (Nectar for native birds)	Large white flowers. Dark green glossy foliage	Clay Loams. Adaptable to sandy loam	Can be directionally pruned to accommodate powerlines	3 metres
Fraxinus griffithii	Evergreen Ash	6 to 8 metres	6 to 8 metres	Rounded	E	Moderate (40-60 Years)	Low	Small white flowers	Sandy Loam Adaptable	Semi-tolerant (ABC's)	3 metres
F*raxinus americana 'Urbdell' [syn. Fraxinus pennsylvannica 'Urbdell']*	(Urbanite Ash	12 to 14 metres	8 to 10 metres	Broad elliptical	D	Moderate (40-60 Years)	Low	Yellowish tan-bronze autumn foliage	Prefers fertile clay loam or alluvial soils but adaptable to poorer class soils	Semi-tolerant (ABC's)	4 metres

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		Height	Spread								
Fraxinus 'Raywood'	Claret Ash	12 to 14 metres	8 to 10 metres	Rounded	D	Moderate (40-60 Years)	Low	Claret red autumn foliage	Prefers fertile clay loam or alluvial soils but adaptable to poorer class soils	Not suitable for positions beneath powerlines	4 metres
Glochidion ferdinandi	Cheese Tree	8 to 10 metres	8 to 10 metres	Rounded	E	Long (50-80 years)	Pigeons, Figbirds & Parrots	Inconspicuous flowers	Prefers fertile Sandy Loam Adaptable to clay loam	Semi-tolerant (ABC's)	4 metres
Harpulia pendula	Tulipwood	10 to 12 metres	7 to 9 metres	Rounded to Broad Domed	E	Long (50-80 years)	Native to East Coast	Colourful Seed pods	Clay Loam. Adaptable to Sandy soils with addition of Organic Matter	Semi-tolerant (ABC's)	3 metres
Hymenosporum flauvum	Native Frangipani	6 to 8 metres	4 to 6 metres	Elliptical	E	Moderate (40-60 Years)	Attracts nectar Feeding Birds	Yellow perfumed flowers	Sandy Loam Adaptable to clay loam	Not suitable for positions beneath powerlines	3 metres
Jacaranda mimosifolia	Jacaranda	12 to 14 metres	14 to 16 metres	Broad-domed	SD	Long (50-80 years)	Exotic - little habitat value	Prolific lavender blue flowers	Alluvial soils	Not suitable for positions beneath powerlines	4 metres
Lagerstroemia austrlis	Crepe Myrtle	6 to 8 metres	6 to 8 metres	Vase-shaped to rounded	D	Moderate (40-60 Years)	Exotic - little habitat value	Yellow to orange red Autumn Foliage	Clay Loam. Adaptable to Sandy soils with addition of Organic Matter	Tolerant	3 metres

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		Height	Spread								
Lagerstroemia indica	Crepe Myrtle	6 to 8 metres	6 to 8 metres	Rounded to vase	D	Long (50-80 years)	Exotic - little habitat value	Pink or white flowers	Clay Loam. Adaptable to Sandy soils with addition of Organic Matter	Tolerant	3 metres
Livistona australis	Cabbage Tree Palm	12 to 14 metres	4 to 6 metres	Elevated rounded	E	Long (50-80 years)	Native to East Coast	Inconspicuous flowers	Sand & Sandy Loam. Adaptable to Clay loam	Not suitable for positions beneath powerlines	3 metres
Lophostemon confertus	Brushbox	12 to 14 metres	12 to 14 metres	Broad elliptical to rounded	E	Long (50-80 years)	Native	Nil	Clay loam to sand. Adaptable	Tolerant	5 metres
Magnolia grandiflora	Bullbay Magnolia	12 to 14 metres	12 to 14 metres	Rounded	E	Long (50-80 years)	Low	Large white flowers	Clay loam to sandy loam	Not suitable for positions beneath powerlines	5 metres
Magnolia 'Little Gem'	Little Gem Magnolia	4 to 6 metres	4 to 6 metres	Elliptical	E	Moderate (40-60 Years)	Low	Large White flowers. Glossy dark green foliage	Clay loam to sandy loam	Semi-tolerant (ABC's)	2 metres
Melaleuca decora	White Feather Honey Myrtle	6 to 8 metres	14 to 20 metres	Rounded	E	Long (50-80 years)	Dense Foliage. Nectar - birds & bats	White flowers	Heavy clays subject to periodic innundation	Semi-tolerant (ABC's)	3 metres
Melaleuca ericifolia	Swamp Paperbark	4 to 6 metres	4 to 6 metres	Rounded	E	Short 10-15 years	Moderate	Creamy white flower spikes	Sand to sandy loam	Should not require pruning due to small size	4 metres

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Melaleuca liniariifolia	Narrow-leaved Paperbark	6 to 8 metres	6 to 8 metres	Rounded	E	Moderate (40-60 Years)	Moderate - Locally-indigenous	Profusion of small white flowers. Papery bark	Clay loam (adaptable)	Can be directionally pruned to accommodate powerlines	3 metres
Melaleuca styphelioides	Prickly Paperbark	10 to 12 metres	8 to 10 metres	Rounded	E	Long (50-80 years)	Dense Foliage. Nectar - birds & bats	White flowers	Sand & Sandy Loam. Adaptable to Clay loam	Semi-tolerant (ABC's)	4 metres
Michelia doltsopa	Silver Cloud	8 to 10 metres	6 to 8 metres	Elliptical	E	Moderate (40-60 Years)	Low	Perfumed white flowers	Sandy Loam to clay loam.	Not suitable for positions beneath powerlines	3 metres
Nyssa sylvatica	Tupelo	12 to 14 metres	8 to 10 metres	Conical to elliptical	D	Long (50-80 years)	Low	Scarlet to crimson autumn foliage	Prefers deep fertile loam soils	Not suitable for positions beneath powerlines	4 metres
Olea europaea 'Swan Hill'	European Olive	8 to 10 metres	6 to 8 metres	Rounded	E	Long (50-80 years)	Low	Inconspicuous flowers	Sand & Sandy Loam. Adaptable to Clay loam	Semi-tolerant (ABC's)	3 metres
Pistacia chinensis	Chinese Pistachio	8 to 10 metres	8 to 10 metres	Broad-domed	D	Moderate (40-60 Years)	Moderate - Parrot family	Scarlet to crimson autumn foliage	Friable clay loam - tolerant of poorer class soils	Can be directionally pruned to accommodate powerlines	4 metres
Pittosporum rhombifolium	Queensland Pittosporum	8 to 10 metres	6 to 8 metres	Elliptical to rounded	E	Moderate (40-60 Years)	Native	Orange Red Seed capsules	Sandy Loam adaptable to Clay Loam	Semi-tolerant (ABC's)	3 metres

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Prunus campanulata	Taiwan Cherry	6 to 8 metres	4 to 6 metres	Rounded	D	Moderate (40-60 Years)	Low	Rosey pink blossum. Yellow-orange autumn foliage	Friable clay loam	Can be directionally pruned to accommodate powerlines	3 metres
Pyrus calleryana 'Aristocrat'	Aristocrat Callery Pear	10 to 12 metres	6 to 8 metres	Broad conical to rounded	D	Moderate (40-60 Years)	Low	White blossom. Orange & scarlet autumn foliage	Clay Loams. Adaptable to poorer class soils	Not suitable for positions beneath powerlines	4 metres
Pyrus calleryana 'Captal'	Capital Callery Pear	8 to 10 metres	2 to 4 metres	Narrow Conical	D	Moderate (40-60 Years)	Low	White blossom. Orange & scarlet autumn foliage	Clay Loams. Adaptable to poorer class soils	Not suitable for positions beneath powerlines	3 metres
Pyrus calleryana	Chanticleer Callery Pear	10 to 12 metres	6 to 8 metres	Conical	D	Moderate (40-60 Years)	Low	White blossom. Orange & scarlet autumn foliage	Clay Loams. Adaptable to poorer class soils	Not suitable for positions beneath powerlines	4 metres
Pyrus calleryana 'Cleveland Select'	Callery Pear	10 to 12 metres	4 to 6 metres	Narrow Conical	D	Moderate (40-60 Years)	Low	White blossom. Orange & scarlet autumn foliage	Clay Loams. Adaptable to poorer class soils	Not suitable for positions beneath powerlines	3 metres
Quercus ilex	Holm Oak	14 to 16 metres	14 to 16 metres	Broad-domed	E	Long (50-80 years)	Moderate - dense crown	Dense dark green foliage, bright green new foliage	Tolerant of poor dry soils.	Not suitable for positions beneath powerlines	5 metres
Quercus palustris	Pin Oak	18 to 20 metres	12 to 14 metres	Conical to elliptical	D	Long (50-80 years)	Low	Crimson to scarlet autumn foliage	Deep fertile alluvial soil prefered. Adaptable to clay loams	Not suitable for positions beneath powerlines	5 metres

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Quercus rubra	Red Oak	16 to 18 metres	16 to 18 metres	Broad-domed	D	Long (50-80 years)	Low	Scarlet autumn foliage	Deep friable clay loams	Can be directionally pruned to accommodate powerlines	4 metres
Quercus suber	Cork Oak	10 to 12 metres	10 to 12 metres	Rounded	E	Long (50-80 years)	Low	Interesting form with furrowed corky bark	Sandy loams with good drainage	Can be directionally pruned to accommodate powerlines	4 metres
Rhodamnia rubescens	Brush Turpentine	10 to 12 metres	10 to 12 metres	Rounded	E	Moderate (40-60 Years)	Bird attracting (fruit Pigeons)	White flowers	Adaptable	Not suitable for positions beneath powerlines	4 metres
Rapanea variablis	Muttonwood	6 to 8 metres	6 to 8 metres	Rounded	E	Moderate (40-60 Years)	Bird attracting (fruit Pigeons, Bowerbird)	Masses of purple fruit	Adaptable	Not suitable for positions beneath powerlines	3 metres
Sapium sebiferum	Chinese Tallow	10 to 12 metres	8 to 12 metres	Rounded	D	Moderate (40-60 Years)	Low	Yellow, orange and crimson autumn foliage	Clay Loams. Adaptable to sandy loam	Can be directionally pruned to accommodate powerlines	4 metres
Schizomeria ovata	Crab-apple	10 to 12 metres	8 to 10 metres	Broad elliptical	E	Long (50-80 years)	Bird attracting fruit	Panicles of white flowers	Rich volcanic soils adaptable to poorer class soils	Not suitable for positions beneath powerlines	4 metres
Stenocarpus salignus	Scrub Beefwood	10 to 12 metres	8 to 10 metres	Broad elliptical	E	Long (50-80 years)	Nectar feeding birds	Small white flowers	Rich volcanic soils adaptable to poorer class soils	Not suitable for positions beneath powerlines	4 metres

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Stenocarpus sinuatus	Qld Firewheel Tree	12 to 14 metres	6 to 8 metres	Elliptical	E	Long (50-80 years)	Moderate (Nectar)	Red flowers	Sandy to sandy Loam	Not suitable for positions beneath powerlines	4 metres
Syncarpia glomulifera	Turpentine	16 to 18 metres	12 to 14 metres	Conical to Broad elliptical	E	Very Long (80 years +)	Moderate (nectar)	Small clusters of white flowers	Clay loam to sand. Adaptable	Not suitable for positions beneath powerlines	6 metres
Syzygium australe	Scrub Cherry	8 to 10 metres	6 to 8 metres	Elliptical to rounded	E	Long (50-80 years)	Moderate	White flowers & red berries	Clay loam to sand. Adaptable	Not suitable for positions beneath powerlines	3 metres
Syzygium leuhmannii	Small-leaf Lillypilly	6 to 8 metres	6 to 8 metres	Elliptical to rounded	E	Long (50-80 years)	Native to east coast	Flushes of new pink growth. White flowers, small red fruits	Clay loam to Alluvial - Adaptable	Semi-tolerant (ABC's)	3 metres
Syzygium oleosum	Blue Cherry	8 to 10 metres	6 to 8 metres	Rounded	E	Long (50-80 years)	Native to east coast	White flowers & pink berries	Clay loam to sandy loam	Not suitable for positions beneath powerlines	4 metres
Syzygium paniculatum	Magenta Cherry	12 to 14 metres	12 to 14 metres	Rounded	E	Long (50-80 years)	Native to east coast	White flowers & pink berries	Clay loam to sandy loam	Not suitable for positions beneath powerlines	5 metres
Tibouchina macrantha	Lasiandra	4 to 6 metres	4 to 6 metres	Rounded	E	Moderate (40-60 Years)	Low	Prolific purple flowers	Clay loam to sandy loam	Semi-tolerant (ABC's)	2 metres
Toona ciliata [syn. *Toona australis*]	Red Cedar	18 to 20 metres	16 to 18 metres	Broad elliptical to rounded	D	Very Long (80 years +)	Moderate	Inconspicuous flowers	Alluvial to clay loam. Prefers rich Basaltic soils.	Not suitable for positions beneath powerlines	8 metres

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Tristaniopsis collina	Mountain Water Gum	6 to 8 metres	6 to 8 metres	Irregular rounded Mallee-like form	E	Moderate (40-60 Years)	Moderate	Small yellow flowers	Sandy Loam. Adaptable to heavy clay	Semi-tolerant (ABC's)	3 metres
Tristaniopsis laurina	Water Gum	8 to 10 metres	8 to 10 metres	Rounded	E	Moderate (40-60 Years)	Native East Coast	Small yellow flowers	Sandy Loam. Adaptable to heavy clay	Semi-tolerant (ABC's)	3 metres
Tristaniopsis laurina 'Elegant'	Elegant Water Gum	8 to 10 metres	8 to 10 metres	Rounded	E	Moderate (40-60 Years)	Native East Coast	Small yellow flowers	Sandy Loam. Adaptable to heavy clay	Semi-tolerant (ABC's)	3 metres
Tristaniopsis laurina 'Luscious'	Luscious Water Gum	8 to 10 metres	8 to 10 metres	Rounded	E	Moderate (40-60 Years)	Native East Coast	Small yellow flowers. Dark green glossy foliage	Sandy Loam. Adaptable to heavy clay	Semi-tolerant (ABC's)	3 metres
Ulmus parvifolia 'Todd'	Chinese Elm	10 to 12 metres	10 to 12 metres	Rounded	SD	Long (50-80 years)	Low	Mottled bark	Clay Loams. Adaptable to sandy loam	Can be directionally pruned to accommodate powerlines	4 metres
Waterhousea *floribunda* 'Green Avenue'	Green Avenue Lillypilly	12 to 14 metres	12 to 14 metres	Rounded to Broad Domed	E	Long (50-80 years)	Native East Coast	Bright green new foliage	Alluvium & Clay Loam. Adaptable to sandy loam	Not suitable for positions beneath powerlines	5 metres
Waterhousia floribunda [syn. *Syzygium floribundum*]	Weeping Lilly Pilly	14 to 16 metres	14 to 16 metres	Rounded to Broad Domed	E	Long (50-80 years)	Native East Coast	Pink new foliage panicles of white flowers	Alluvium & Clay Loam. Adaptable to sandy loam	Not suitable for positions beneath powerlines	5 metres