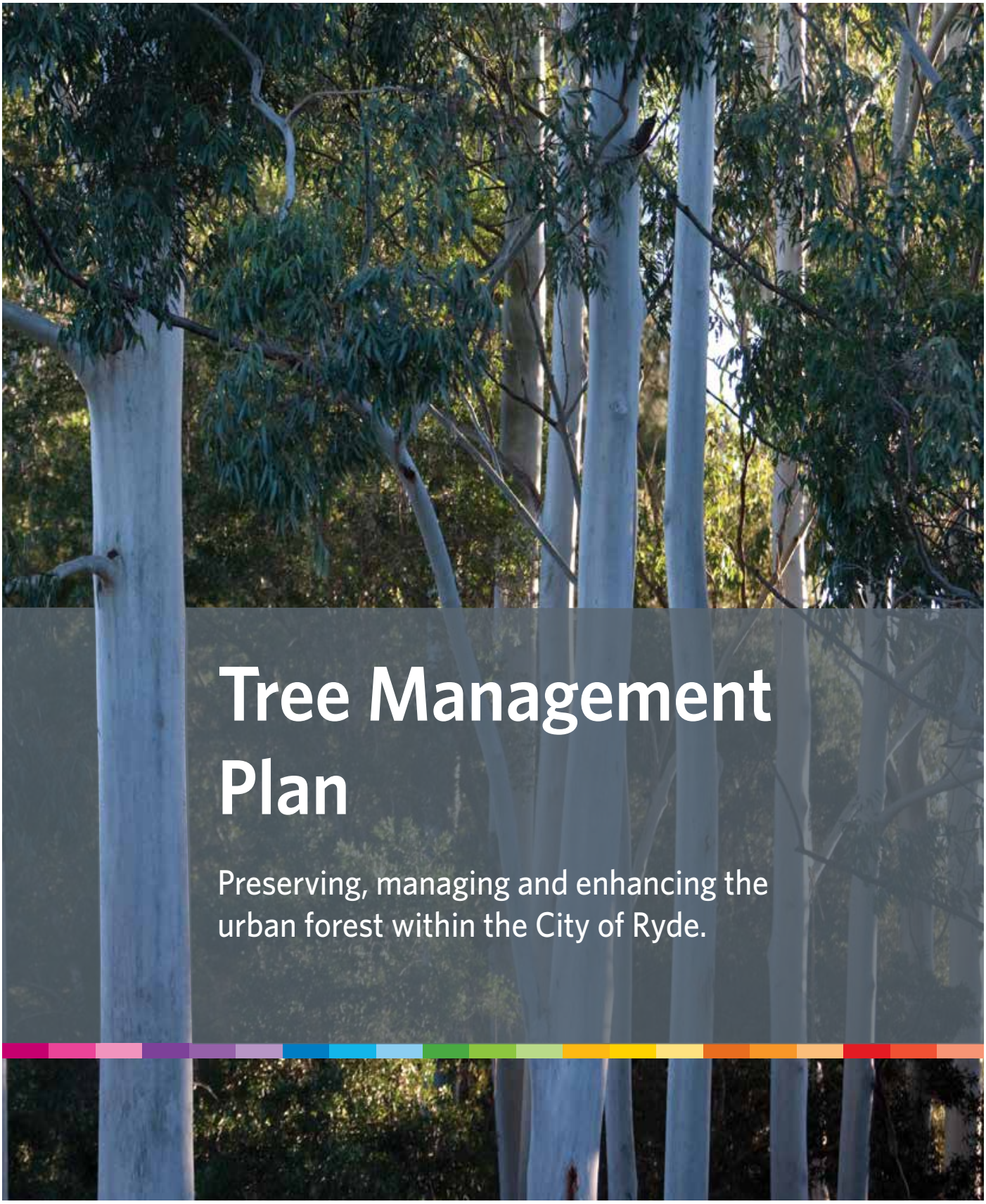

Tree Management Plan

Preserving, managing and enhancing the urban forest within the City of Ryde.

City of Ryde

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DOCUMENT CONTROL

ISSUE NAME	ISSUE DATE	PURPOSE
DRAFT 5	20 January 2012	Presented to ET
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Tree Management Plan

Contents

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1. Introduction

The management of the urban forest in an urban environment is becoming increasingly challenging within the City of Ryde. With the issues of urban consolidation, overhead and underground infrastructure, managing the actual and perceived risks associated with trees, planning controls and deliberate tree vandalism, the increasing the pressures on the tree population and on the native flora and fauna are requiring the City to modify the way it actively manages its urban forest. The City of Ryde is taking a strategic approach to managing the longevity of the urban forest.

Trees are essential to our landscape. Individually and collectively, they contribute to the character of the City and quality of life of the local community. Trees have many environmental, economic and social benefits that contribute to the importance of trees as a community asset.

The City of Ryde is committed to becoming an ecologically sustainable City through the professional management of the City's natural and physical environment and the conservation of natural resources to ensure the health, diversity and productivity of the local environment is maintained or enhanced for the benefit of future generations. The City's Environment Strategy (2007) sets out the following vision of sustainability:

> ***" A vibrant City that values and protects the natural environment and enriches the living environment by promoting ecological integrity, economic security and social well-being for the benefit of current and future generations".***

The City of Ryde recognises the importance of trees and diversity in species and structure of vegetation in achieving this vision and the Tree Management Plan provides strategic direction for the preservation, management and enhancement of the urban tree canopy and plant diversity into the future.

1.1 What is the City of Ryde's urban forest?

The City of Ryde's urban forest consists of trees and other vegetation (understorey - shrubs and groundcover) in an urban area providing low, medium and high canopy cover. In the City of Ryde the urban forest includes:

- street trees and vegetation on roundabouts, median strips, road verges and nature strips,
- trees and vegetation in public parks including bushland areas,
- trees and vegetation in retail, commercial and industrial properties, and
- trees and vegetation in front and back gardens of private properties including balcony gardens, green roofs and vertical gardens.

The urban forest is an important part of the City's public infrastructure as it complements and enhances other parts of the built environment such as footpaths, roads, services and buildings.

By adopting an urban forest approach to the planning and management of trees, the City of Ryde is taking a holistic and strategic approach which aims to ensure that the Ryde community will receive

maximum benefit from their urban forest at an acceptable cost and in a manner based on the principles of ecologically sustainable development (ESD). The City of Ryde's urban forest approach incorporates the following management principles:

- Planned Management - fundamental to achieving the optimum extent and quality of the urban forest.
- Systematic Management - the optimum outcomes from the urban forest will be attained when the resources invested in its management are adequate and are managed efficiently. This will provide the best cost benefit outcomes.
- Integrated Management – management of the urban forest must be integrated with the management of the entire urban environment - built infrastructure and natural places - to achieve the best outcomes for urban areas.

1.2 Objectives of the Tree Management Plan

The Tree Management Policy describes what the City of Ryde wants to achieve in relation to the urban forest. The principle aims of the Tree Management Plan is to explain how the Tree Management Policy will be implemented and identify specific actions the City of Ryde will take in managing its urban forest into the future.

The objectives of the Tree Management Plan are as follows:

- To provide a list of actions that will combine to achieve the Tree Management Policy Management Goals,
- Recommend sustainable management guidelines,
- Provide a clear framework for all management actions including priority setting, timeframes and accountabilities for delivery.

1.3 Structure of the Tree Management Plan

The Tree Management Plan has the following sections:

- Section 1 - Introduction
- Section 2 - Policy framework that details the policy background to the management of trees in the City of Ryde.
- Section 3 - Benefits of trees: A discussion on why trees are essential in the City of Ryde landscape.
- Section 4 – Existing conditions: A analysis of the major issues impacting the placement, growth and management of tree within the City of Ryde.
- Section 5: Strategic direction: lists the actions, priorities, time frames and accountability for the five key Tree Management Policy Management Goals.

2. Policy Framework

The importance of the urban forest is articulated in the Tree Management Policy (2012) and it is important to ensure that the goals set out in this Plan are compatible with the community's wider vision for the future of the City of Ryde. For this reason, the Tree Management Plan incorporates the direction set by a number of other City of Ryde policy and strategy documents to form a comprehensive strategy for the ongoing sustainable management and enhancement of the urban forest.

The establishment of the urban forest management approach within the City of Ryde has required the development of a series of documents that combine to provide a suite of proactive and achievable management targets for the City. Figure 2.1 provides a snapshot of the strategic documents that influence the management of the City's urban forest.

Figure 2.1 Strategic and Operation Documents influencing the Management of the Urban Forest

Goal and Strategy definition	Ryde 2021 Community Strategic Plan Tree Management Policy and Tree Management Plan Integrated Open Space Plan
Development Controls	Ryde Local Environmental Plan, 2010 Development Control Plan - Tree Preservation Technical Manual Ryde Public Domain Technical Manual
Urban Forest Enhancement	Street Tree Masterplan Open Space Plans of Management
Urban Forest Management and Protection	Significant Tree Register Community Education Program
Operational Management	Service Level Agreements for Maintenance, Design and Development Assessment

2.1 Policy and Planning Framework

2.1.1. Ryde 2021 Community Strategic Plan

The Ryde 2021 Community Strategic Plan is a long term strategy which provides continuity and guidance for the community, councillors and staff with the aims of ensuring the City of Ryde lives up to the aspirations of the community.

One of the challenges identified in the Ryde 2021 Community Strategic Plan is to

> ***"plan and design a growing and liveable city through considered urban renewal and land use, while protecting and enhancing the natural assets ..."***

This Tree Management Policy responds to that challenge by promoting a vision of the urban forest for the future and by setting out principles for the management of the urban forest within the City of Ryde.

The plan collates these aspirations into 7 outcomes and lists goals and strategies for each outcome. Particularly relevant to the preservation and management of the urban forest listed below.

City of Ryde Outcomes and the Urban Forest

Outcome C01 - A City of Liveable Neighbourhoods

- All residents enjoy living in clean, safe, friendly and vibrant neighbourhoods.
- Our community has a strong sense of identity in their neighbourhoods and are actively engaged in shaping them.
- Our neighbourhoods thrive and grow through sustainable design, planning and regulation that support community needs.

Outcome C02 - A City of Wellbeing

- Our residents are encouraged and supported to live healthy and active lives
- All residents feel supported and cared for in their community through the provision of ample services and facilities.
- Residents feel secure and included in an environment where they can connect socially and are supported by their neighbours.

Outcome C03 - A City of Environmental Sensitivity

- Our residents, businesses and visitors collaborate in the protection and enhancement of our natural environment.
- To encourage and enable all our residents to live a more environmentally sensitive life.
- As we grow, we protect and enhance the natural and built environments for future enjoyment and manage any impacts of climate change.

2.1.2 Tree Management Policy (2012)

The Tree Management Policy informs the manner in which the City of Ryde will manage its tree assets and work towards providing a sustainable approach to urban forest management. The aim of the policy is to reinforce the City of Ryde's commitment to the sustainable management of the Urban Forest through the following policy principles.

- Recognition that the urban forest is an intergenerational asset within the City that needs to be managed to preserve its value to the community,
- Recognition that the asset value of trees in an urban environment and a commitment to management strategies that consider this value,
- Recognition of the need to preserve, manage and enhance the urban forest within the City and to pro actively respond to pressures on tree resources from population and economic growth, demographic changes and the effects of climate change,
- The importance of a framework for planning management of the urban forest in both public and private domains, and
- Commitment to ongoing collaboration between Council departments and with the local community to achieve best outcomes for the City of Ryde's Urban Forest.

The Policy represents a shift in approach by the City of Ryde away from dealing with trees on an individual, ad-hoc basis to managing trees as an urban forest.

2.1.3 Local Environment Plan 2010 Clause 5.9

The Local Environment Plan 2010 (LEP) is the City's principal environmental planning instrument. Specific parts of the LEP relate to environmental issues including clause 5.9 which is:

> ***"to preserve the amenity of the area, including biodiversity values, through the preservation of trees and other vegetation".***

2.1.4 *Development Control Plan 2014 Part 9.5 (Tree Preservation) (2014)*

The Development Control Plan (DCP) Part 9.5 (Tree Preservation) is a regulatory planning tool which sets out the procedural framework governing the removal, pruning of trees, and alteration of soil levels close to trees. It applies to all privately owned land and land under the ownership or care, control and management of the City of Ryde. The overriding goal of DCP Part 9.5 is to ensure the preservation of trees within the City and this reflects the objective of Section 5.9 of the LEP.

2.1.5 *Tree Management Technical Manual (2014)*

The Tree Management Technical Manual is the companion document to DCP Part 9.5 (Tree Preservation) providing the technical arboricultural information referred to in Part 9.5. It details:

- The acceptable standards for tree assessment and the protection of trees on development sites within the City of Ryde,
- Qualification and reporting specifications for arborists and other providers of technical information to support submissions to the City of Ryde,
- Qualification requirements and standards applicable to persons carrying out work on trees,
- Details of pruning requirements, and
- Specifications and guidance for residents in relation to replacement tree planting.

2.1.6 *Street Tree Masterplan*

The Street Tree Masterplan will guide the City of Ryde in the management and enhancement of the street tree plantings across the City. The masterplan defined the strategic approach to the selection and placement of street trees that will be used by Council Officers, designers and developers in the planning and designing of streetscapes in the City of Ryde.

The Street Tree Masterplan:

- Defines the criteria used for street tree species selection for all future planting projects,
- Provides a precinct style masterplan that identified broad site conditions, soil and ecological constraints that influence tree selection,
- Increases opportunities for street tree planting within the LGA with a targeted and effective implementation strategy supported by the community.
- Increases diversity of the tree population to assist with correct tree installation for the site and reduce the risk of canopy loss due to pest and diseases.
- Identifies opportunities for new planting within streets
- Aims to reduce the conflict between services and trees by having options for tree planting adjacent to or beneath services
- Develops guidelines for all future street tree plantings across the City

2.1.7 Significant Tree Register

The City of Ryde developed a Significant Tree Register in March 2003. The objective of the Register is to recognise and attach importance to trees with cultural, historic, ecological, scientific and/or aesthetic value.

In it current form, trees (indigenous or exotic, wild or cultivated) will be considered for inclusion in the register on the basis of one or more of the following categories:

- Outstanding aesthetic significance.
- Outstanding for its height, trunk circumference, or canopy spread,
- A tree which is particularly old,
- A tree commemorating or having associations with an important historic event or significantly associated with a well known public figure or ethnic group,
- A tree associated with aboriginal activities,
- A tree which occurs in a unique location or context and so provides a contribution to the landscape, including remnant native vegetation, important landmarks and trees which form part of an historic garden or park,
- A tree of a species or variety that is rare or of very localised distribution,
- A tree of horticultural or genetic value which could be an important source of propagating stock,
- Any stand or avenue of trees which is significant, and
- Any significant community of trees.

The Significant Tree Register is listed for review to ensure its alignment with the principles of the Tree Management Policy and this Plan.

2.1.8 Service Level Agreements

To enure the long term proactive and cyclic management and maintenance of the City's urban forest, the establishment of service level agreements are essential. The establishment of these agreements should include:

- A comprehensive and centralised urban forest inventory linked to Council's mapping
- Development of key policies to drive new initiatives and strategies
- More integrated planning, management and design of public trees
- Performance indicators to establish how well new initiatives are performing.

A review and upgrade of Service Levels Agreements will follow from the adoption of the Tree Management Plan.

2.2 Other City of Ryde strategic documents

2.2.1 Integrated Open Space Plan (2012)

The Integrated Open Space Plan (IOSP) is the guiding document for the planning and management of the public open space within the City of Ryde.

Analysis of community needs and demands identified that the natural environment is of high importance to the residents of the City. The IOSP recommends ways of managing and enhancing open space sustainably into the future. Recommendations relevant to the preservation and management of the urban forest include the need for:

- greater connectivity between reserves, both physically and environmentally (bushland and creek corridors and linked habitat),
- streetscape designs that encourage walking and cycling for recreation and transport (trees for shade and amenity, safe paths and crossings),
- fostering opportunities for social engagement along path and cycle routes (eg neighbourhood street corner seats in the shade of trees),
- integration of natural environment initiatives more significantly throughout the City's open spaces and urban spaces by increasing connectivity and reducing fragmentation of habitat
- enhanced habitat connectivity allied to a web of new or extended recreational links, based on existing ridgelines and creek alignments, and on locations of original creek lines no longer in existence,
- native canopy links along ridges through existing open spaces and streetscapes,
- building education and awareness of the values of the City's extensive natural environment,
- climate change adaptation within reserves through increased shade from trees and exploiting cooling breezes on ridges and river foreshores through planting design and bushland regeneration, and
- greatly increased shade and shelter (trees for the longer term, shelters for the shorter term or for more extensive shade areas) and exploitation of summer breezes.

The IOSP proposes a comprehensive 'web' of combined recreational and natural corridors as the primary framework for the City's network of open space. This web would be a combination of existing creek and river corridors and a "green grid" of streets. The corridors would be extended along their natural catchment boundaries following streets and connect currently un-connected parks. The streets selected would be characterised by continuous canopy of native tree planting of mainly native tree species local to the area and would provide principal cycle and walking routes linking the green web corridors, and neighbourhood and town centres.

3. The benefits of trees in an urban environment

3.1 Introduction

Collectively and individually trees contribute to the appeal and quality of life in the City, therefore the retention and preservation of trees is an important outcome. However, effective management of trees as a natural resource recognises that the long-term retention of trees depends upon community attitudes, maintenance, appropriate location and species selection.

Trees are an important part of our cultural and natural landscape. Trees are essential to our landscape. They contribute to the aesthetic quality of our living environments, they soften the harshness of buildings and roads and their size provides a sense of scale within the built environment, and they create a retreat for those wishing to escape suburbia. They are a community asset.

Despite this essential relationship between humans and trees, there is an increasing tendency to adversely impact trees in both natural and urban areas. Decisions to destroy trees in urban environment are based on a number of key motivators including:

- development,
- conflict with other urban infrastructure,
- fear and risk concerns,
- current landscaping fashion, and
- aesthetic preferences.

Tree management seeks to protect those trees that make a contribution to the quality of life and the environment in Ryde while balancing the reasonable expectation of the landowner to protect and maintain their property.

In addition to the basic fundamental need for the presence of trees in our environment, there are many other values or benefits of trees which can be grouped into three general categories:

- environmental benefits,
- economic benefits, and
- social benefits.

These are listed and discussed in Table 3.1

Table 3.1 The Benefits of Trees

	BENEFIT	DISCUSSION
Environmental	Provide wildlife habitat	• Trees provide a food source, shelter and habitat for wildlife.
	Reduction in soil erosion	• Wind breaks are used in urban and agricultural areas to deflect and reduce air movement from prevailing winds. • Trees also intercept rain and reduce the velocity of rain when it hits the earth's surface. • Trees will increase water absorption and reducing erosion of the soil.
	Clean the soil	• Through phytoremediation, trees absorb chemicals and other pollutants that have entered the soil.
	Improve air quality and atmospheric purification	• Trees improve air quality by capturing particles and other airborne pollutants from transport and industry.
	Carbon absorption, storage and sequestration	• Trees remove carbon dioxide from the air through photosynthesis and stores it in the tree.
	Produce oxygen	• As a by-product of the photosynthetic process, trees emit oxygen. It is estimated that a mature leafy tree produces as much oxygen each season as 10 people inhale in a year.
	Reduce carbon emissions	• The presence of trees in urban environments provide shade and therefore reduced need to burn fossil fuels for cooling.
	Reduce air temperature and produce microclimates	• Trees provide shade and intercept solar radiation and alter wind flow, thus creating pockets of cooler temperatures under their canopies. • Modulation of temperatures both by shading and increased humidity.
	Reduce wind speed	• Wind breaks and informal tree plantings will reduce wind speed at ground level created in many urban areas from building placement. • Trees also mitigate the wind tunnelling effect between tall structures.
	Provide summer shade and winter sun	• Deciduous and evergreen trees provide shade in summer months reducing energy needs. Deciduous trees allow sunlight to penetrate areas in winter reducing heating needs. • Protects the population from the harmful effects of UV exposure from the sun.

	BENEFIT	DISCUSSION
Economic	Reduce the cost of heating and cooling	• Reduce the cost of heating and cooling • Carefully placed trees will reduce the need for heating / cooling and thus reducing the cost of heating / cooling a building.
	Energy conservation	• Energy conservation. Some research has determined that in areas where the summers are long and warm (like in Sydney), trees offer the maximum benefit in energy conservation.
	Increase property values	• Studies have shown that properties in tree lined streets and where there is a well developed tree canopy have a higher market value. The reasons for this may include an acknowledgement of future savings in cost of heating / cooling the houses and psychological and aesthetic reasons.
	Increase patronage to commercial areas	• Trees improve air quality by capturing particles and other airborne pollutants from transport and industry.
		• Trees and landscape areas create environments that attract businesses, shoppers and tourists.
Social	Enhance privacy	• Trees planted in strategic positions will provide visual screens and enhance the sense of privacy in urban areas.
	Reduce glare and light spill	• Trees planted in strategic positions will provide screening from street lights, car headlights and reflected light from buildings.
	Psychological benefits and social interaction	• While trees are not very effective in reducing noise levels, they do provide the psychological benefits to humans through "out of sight, out of mind". This provides an element of relief from noise, poor views, proximity to transport corridors etc. • There are psychological benefits for humans living in close proximity to trees and "green" spaces. Trees have a positive effect on mental and physical health. • Interaction and visual connection with trees and "green" spaces from offices and places of work helps to reduce stress and anxiety and improve employee productivity.
	Provides a connection to nature	• People respond to nature. There is a deep psychological connection between humans and nature and seeing and interacting with trees provides respite from the speed and rigour of daily life.
	Increase the perception of safety	• The placement of trees and gardens within urban environments encourages people to sit and congregate and thus reduces the perception of fear and danger. Trees provide protection by separating roads and public places. • Trees improve the "walkability" of streets by providing protection from rain and the sun.

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4. Existing Conditions in Ryde

4.1 Context

The City of Ryde covers an area of approximately 40 square kilometres and it is set in scenic surrounds, with the Lane Cove National Park and Lane Cove River in the north and Parramatta River in the south and east. The National Park and rivers support a considerable variety of native bushland and associated flora and fauna. The City's settlement pattern has been defined by its natural features.

The City of Ryde has a rich history. The traditional Aboriginal owners of the land are the Wallumedegal clan of the Dharug people. European settlement of the Ryde area commenced in 1792 when a land title was issued on the northern bank of the Parramatta River and was named the Field of Mars. Since then, the City has progressed to be an area with a mix of residential suburbs, business, retail and education centres. Today the City has a culturally, linguistically and economically diverse community of in excess of 108,300 people.

Residents are mostly appreciative and protective of their remnant bushland areas, parks and water ways. Many residents have chosen to live in the City because of its environmental qualities. These, combined with its proximity to the CBD and a range of services and employment opportunities, make the City of Ryde a desirable location to live and work.

The City of Ryde is a transition landscape where the Hornsby Plateau begins to slope to the south-west. The waterways that pass through the area have cut through the Wianamatta shale to the underlying Hawkesbury sandstone. The geology of the City influenced the original vegetation communities. These communities included Sydney Turpentine Ironbark Forest, Blue Gum High Forest, sedge swamps and mud flats, and estuarine communities (Benson and Howell, 1995).

The City's current knowledge of the vegetation communities within the City of Ryde is based on a study by Oculus published in 2001. The communities identified as being present within the City at that time were:

- Sydney Turpentine Ironbark Forest;
- Blue Gum High Forest;
- Shale sandstone transition forest;
- Sydney sandstone gully forest;
- Sydney sandstone ridgetop woodland; and
- Estuarine complex.

Sydney Turpentine Ironbark Forest and Coastal Saltmarsh in the NSW Sydney Basin (part of the Estuarine complex) are listed as endangered ecological communities in Part 3 of Schedule 1 of the *Threatened Species Conservation Act 1995* (NSW), Blue Gum High Forest is listed both as a critically endangered ecological community in Part 2 of Schedule 1A of the *Threatened Species*

Conservation Act 1995 (NSW) and as critically endangered under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth).

Oculus (2001) described Sydney Turpentine ironbark forest as "probably the most common native bushland type in Ryde before European settlement". Most of this has been cleared for agriculture, timber and urban development and as a result very few remnants of Turpentine Ironbark Forest remain in Australia. An example of this is the Wullamatta Nature Reserve in North Ryde.

The growth of the City has resulted in a dramatic loss of tree canopy and vegetated areas however small pockets of remnant vegetation remain. Both Sydney Turpentine Ironbark Forest and Blue Gum High Forest are likely to become extinct unless the human activities threatening their survival cease and remaining remnants are protected and managed sustainably. Threats include clearing, physical damage from recreational activities, rubbish dumping, mowing and weeds (Oculus, 2001). The conservation of the remaining pockets of remnant vegetation within the City is critical.

Flora and Fauna Studies carried out by Biosphere (2007 and 2008) also detail the species found in the City of Ryde.

4.2 Trees in Ryde

The total number of trees within the City of Ryde is unknown. Accordingly Council can only estimate the size and scale of the City's urban forest. This lack of baseline data is a major deficiency in the application of proactive management of the City's urban forest.

4.2.1 Street Trees

Street tree planting within the City has increased in number over time. In the early year of the City's development, Ryde had a very strong agricultural land use prior to redevelopment for housing. Orchards were extensive across the Ryde LGA particularly in Putney, North Ryde, Denistone East, Marsfield and Macquarie Park.

Eastwood, West Ryde and Ryde were traditionally developed along the railway lines and major roads of the time for free standing residences. Tree planting in streets and beautification was not a priority programme for Council public works.

In the 1920s and 1930s there was experimentation with Australian rainforest species and Myrtaceous family. Brushbox and to a lesser extent Camphor Laurel. This period of planting has contributed to many of the mature trees that are now in decline and have been replaced with smaller species such as *Callistemon* and *Prunus*. During the 1970s the resurgence of interest in native and endemic plants contributed greater species diversity to the streetscape. The use of Eucalypt forestry species such as Tallowoods, Wallangara White Gums and Peppermints were particularly in favour at the time, however many of these species have proven to be susceptible to pests and diseases and have become hazardous.

Council is responsible for planting and maintaining all street trees. Most streets within the City have trees however the number and condition of street trees in continuously fluctuating. At the present time Council does not have a tree asset register or carry out audits of street trees within the City.

Tree Management Plan

Street trees play an important role in the City, both acting as a green connection between parks and providing a green streetscape to be enjoyed by residents. The choice of tree species (whether native or exotic) helps create the look and feel of each neighbourhood.

To maintain and enhance the street tree population across the City all existing street trees should be retained where they are planted in appropriate locations, there should be a planned removal and replacement of over-mature trees and new street tree planting opportunities should be sought in all streets, with priority given to those streets with no or few existing trees.

In an urban environment a tree's ability to manufacture more energy (by photosynthesis and respiration) are likely to be detrimentally affected by site conditions such as poor soil quality, compacted soil, small pavement openings, competition from other plants, grass and weeds, and confined above and below ground growing space. These conditions all adversely effect crown and root development. Pruning for power line clearance, canopy wounding from car doors and trucks, and trunk wounding from lawn mowers and whipper snippers also reduces leaf area and damages conducting tissues. The consequences of all of this are likely to be poor tree vitality and structural condition.

Some of the other issues faced by the City of Ryde in relation to street trees are:

- increasing population growth and consequent development pressure will, without strategic replanting, progressively lead to the loss of street trees within suburbs;
- conflict with other urban infrastructure and services: all dwellings require a combination of access roads, electricity and gas supply, water supply, sewerage, and telephone and communications (eg. internet and pay TV). This infrastructure is aging and installed in the past with little concern as to the environment or visual aesthetic;
- public liability risk management: the City's Tree Management team and tree maintenance staff spend much of their time and budget trying to resolve conflicts between street trees and the urban infrastructure (eg. footpaths, roads and buildings) and abate potential hazards caused by street trees such as roots lifting pavements, fruit drop causing slip hazards or branch drop;
- ongoing maintenance: Both existing and new trees need to be pruned to improve structural condition and safety (eg. pruning the low branches over footpaths and for vehicular sight lines). New young trees need to be regularly inspected and formatively pruned to avoid future structural problems;
- vandalism of existing and new trees: including ringbarking, poisoning and unauthorised branch removal;
- species selection: the community has diverse views as to the type of trees they want planted in their street including whether the trees are native or exotic species, and whether there should be many species planted in one street for biodiversity and habitat conservation or just one to create an avenue effect. Inappropriate selection can lead to a conflict between trees, infrastructure and buildings. Site conditions vary and impact on species selection eg. soil type and depth, size of planting area (above and below ground), and the presence of and type of overhead services;

- Views versus trees: Many residents enjoy views of the Parramatta River, the Sydney skyline or parks and bushland. Residents frequently complain about tree canopies obstructing these views. The City of Ryde does not consider the loss of a view to be sufficient reason to remove or prune a tree.

4.2.2 Park Trees

The City of Ryde has 355 hectares of open space divided into 197 parks. These parks are a combination of sports grounds, foreshore reserves, bushland reserves and passive parklands. 205 hectares of land is natural bushland and the City is bordered on the north by the Lane Cove National Park. Parks provide green space that breaks up the visual impact of built elements in the urban landscape. Bushland reserves in particular also act as conservation areas for remnant flora and fauna. As the City has developed these areas have become smaller and more isolated.

The IOSP analysed open space setting types across the City and from this concluded that most of the large natural areas and bushland are not well connected to the core of the City and although passive parkland settings are the most numerous, they are also the smallest in size.

Some of the issues faced by the City of Ryde in relation to trees in parks are the same as those with street trees, as discussed above. In addition, many parks currently have limited habitat value because they consist only of canopy trees that do not supply a continuous canopy from ground level to tree canopy to protect foraging fauna. Biosphere (2007) identified the need to take steps to reduce the:

- sources of disturbance in bushland reserves,
- loss of biodiversity,
- removal of fallen timber and dead trees from bushland areas, and
- the "edge effect" (physical damage, modified environmental conditions and adverse human impact) to plants along the boundaries of reserves which eliminates the more sensitive native plants leaving gaps for weed growth).

New and replacement planting needs to balance conserving the habitat potential of parks with the needs and demands of sports users and park neighbours.

Council has very little information on the species make up, number and condition of trees within the City's parks. The Plans of Management for the City's open spaces contain little discussion of trees.

4.2.3 Trees on private properties

The third group of trees critical to the Urban forest canopy is trees on private property. Private front gardens have been described as borrowed landscape as they significantly contribute to the visual character of a streetscape and the neighbourhood. Trees planted in back gardens can provide shade, screening, habitat and add to the visual amenity of the surrounding houses and the wider landscape.

Tree Management Plan

Trees on private land across the City of Ryde are a mixture of native and exotic trees, and this creates a collage of texture, colour and seasonal change to the landscape in addition to the benefits of enhanced diversity of species and age of the tree. These trees are subject to planning controls that control the removal and pruning of the trees and the alteration of soil levels close to them (increasing or removing soil close to a tree can have an adverse impact on the tree's vitality and cause it's death).

The main reasons for the removal of trees on private land within the City of Ryde are:

- Inappropriate tree planting: both in species selection and location,
- Increasing urban density: large housing blocks are increasingly being subdivided with the new buildings having a larger footprint and thereby less room for vegetation and trees. Also changes to the growing environment may have an adverse affect on the vitality of the tree (eg. cutting roots to lay new below ground services or changes to soil hydrology causing either less or more soil moisture); and
- Risk management: the need to remove trees following storm events or as a result of changes to the growing environment as a result of new development.

The maintenance of the Urban Forest canopy must be addressed in the development process to limit the incremental loss of trees over time and to maximise replacement tree planting.

The City of Ryde must continue to be proactive in the protection of trees on development sites.

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5. Challenges for Urban Forest Management in Ryde

Urban forest management is a new approach to tree management at the City of Ryde and it requires a considered balance of community expectations, an understanding of tree morphology, application of risk mitigation and an awareness of the urban forest. This is further complicated by the different values placed on the urban forest by the community and the community's understanding of the role of trees.

Often Council's process of managing trees can be dominated by tree removal. This occurs as a result of differing community expectations and lack of understanding of trees in our community,

Council has on staff arborists, landscape architects, environmental scientists, horticulturists, tree climbers, landscape staff, traffic engineers, engineers, urban designers and town planners that are used to making decisions on the management of trees and maintain the urban tree population across the City. The combined skills and knowledge of these professions is required to ensure sustainable management of Council's tree resources.

This Section outlines some of the challenges the City of Ryde faces in the management of the urban forest and offers a discussion on how the Plan will address these challenges.

5.1 Measuring the urban forest

In order to manage the urban forest, the City of Ryde needs to know the extent of the forest. The City of Ryde does not know how many trees it has, or the age and condition of those trees. Consequently, the City does not have an understanding of the financial value of the tree assets it maintains nor can the City define numerical targets for the embellishment of the urban forest.

The City has decided to endorse an urban forest approach to the management of its trees as adopted by the NSW Local Government Association (LGA) in 2003. The vision for urban forests set out in the LGA's Urban Forest Policy (2003) is:

> *"By 2050 the extent and quality of urban forests will have achieved identified and agreed targeted canopy coverage and will be providing optimal benefits at acceptable costs."*

The size of an urban forest is measured as a percentage of canopy cover. The City does not know the existing percentage cover and is therefore unable to determine an appropriate and achievable canopy cover target, monitor progress or analyse where changes occur. A comprehensive understanding and assessment of the existing urban forest has never been undertaken by the City of Ryde. Without this information it is difficult to proactively manage the urban forest, set strategy and targets, and measure success.

A comprehensive inventory of the City's tree assets needs to be prepared. The inventory should contain all relevant information about each tree including the location, species, size, approximate age, health and condition. This approach adheres to the Statewide Best Practice Manual (2003) which advocates the importance of Councils having a policy to inform the uniform management of trees. In addition to this information, all complaints or notification of problems with trees from

residents would be recorded on the inventory plus any remedial action, maintenance and other work to build up a work history on a tree by tree basis and as the collective urban forest. Collection of data should start with trees in high use and known problems areas.

The preparation and use of tree inventories is becoming increasingly common in local government agencies. An inventory of all public trees will help provide a comprehensive picture of the City's urban forest. The inventory data will enable the effective management of trees, provide a baseline for measuring future progress, and also guide planning and the allocation of daily work activities (for maintenance activities such as formative pruning, and pest and disease control).

While there are many different types of inventory and audit systems available for documenting the public tree asset base, a computerised geo-spatial information system is preferred because it is a powerful tool that can enable mobile access to street tree information as well as encourage integrated management of trees across the City. A centralised database can offer information to assist with tree permit applications, development application assessment, identification and planning of tree works and programming regular maintenance.

With accurate and comprehensive base data, and ongoing management of the inventory, information gathered can be used to analyse changes in the City's urban forest canopy, calculate the monetary value of the urban forest, record tree performance to provide a basis for future tree species selection, and measure energy conservation, air quality improvement, carbon dioxide reduction, stormwater control, and property values. Furthermore, the City can implement a proactive programs for tree maintenance that can reduce the City's exposure to risk and can contribute to a reduction in insurance on costs.

5.2 Aging tree population and succession planting

All trees age and have a finite lifespan. A senescent tree is a tree of advanced old age or over mature tree which is declining towards death (Draper and Richards, 2009). The City of Ryde does not know what percentage of its tree population is senescent.

Responsible management of senescent trees is essential in urban areas such as streets and parks. Senescent trees are generally more susceptible to disease, insect infestation and decay, and over time they may become structurally unsound. As trees age they require increased monitoring and maintenance to manage their hazard potential and to mitigate risk. The City does not currently have a rolling maintenance programme but deals with potential hazards on an ad-hoc basis in response to notifications from the community.

The management of senescent trees is an emotive issue as the community often places a high value on older trees. There is frequent community objection to the removal of these trees because they contribute to the visual and cultural landscape of the City. While this is positive because it shows a desire to care for and retain trees in the landscape it limits effective long term management of the City's urban forest because the ability to remove trees is important for coordinating replacement tree programmes (Parker et al, 2004).

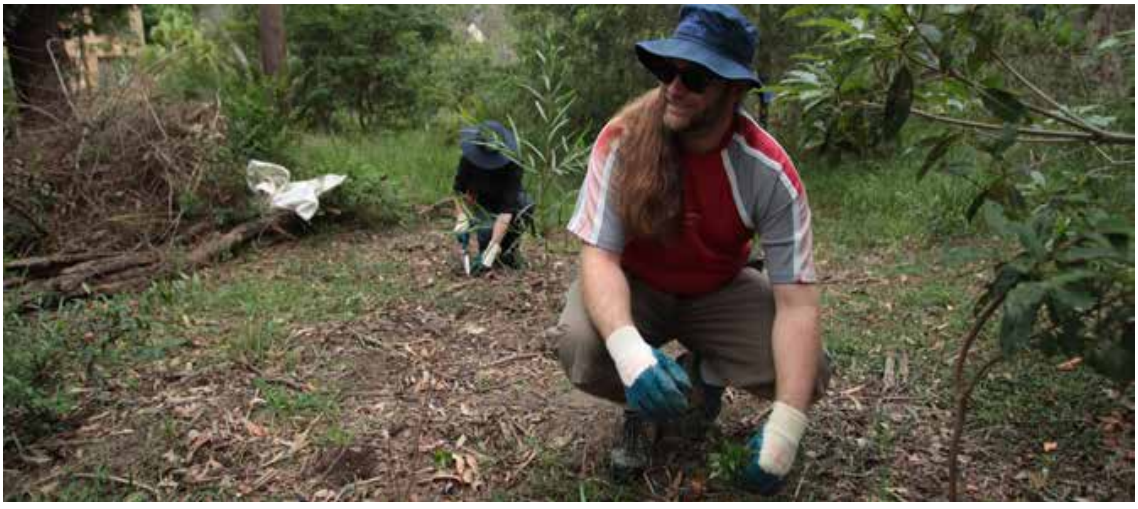
Tree Management Plan

To sustain the urban forest senescent trees need to be replaced. To successfully manage tree senescence the City of Ryde needs to plan for tree removal and replanting, and manage community expectations and perceptions. This involves making decisions as to the best time to remove trees, and how removal will affect neighbouring trees and the urban forest as a whole. Succession planting is important because it will shape the character of the City for future generations (Parker et al, 2004). It is important to note that not all trees that are in senescence require removal provided proactive management of the trees is undertaken.

To enable the City's Tree Management Officers to plan and make informed decisions about the ageing tree population, they need to be equipped with information on the expected longevity of the tree population, indications of tree senescence patterns and projections on when tree removals and replanting will be necessary. Tree maintenance, removals and replacements can then be budgeted for and programmed.

The use of appropriate methods for determining tree age and life expectancy should be carried out across the City. Determining Useful Life Expectancy (ULE) is one method of determining the expected longevity of the tree population which the City may choose to use. This is not an estimate of the biological life span of a tree but rather an estimate of the period a tree can be usefully retained on a specific site given the condition of the tree, its environment, proposed maintenance and risk management. The ULE of a tree decreases once costs of managing a tree outweigh the tree's social, economic and environmental benefits.

There are a number of approaches to succession planting. Currently the City of Ryde removes and replaces trees individually on an ad-hoc basis. This work is generally unplanned, and the cost of planting and maintaining isolated individual establishing trees is expensive. Staged succession planting across the City is preferable. This approach means that the City will not wait until a tree dies or declines before taking steps to remove and replace the tree. Instead, the City will plan in advance to remove and replant small sections of trees or, where appropriate, remove and replace whole stands or avenues of aging or declining trees. A Street Tree Masterplan is being to set the direction for planned removal and replanting in the future and identify key tree streets and precincts



that are a high priority.

In addition, the preparation of a tree inventory (as referred to in section 4.3.1 above) will provide the opportunity to record and plan for tree succession planting through the reporting and monitoring of tree age. It will also assist in forecasting tree senescence patterns. There is little point in planting replacement trees if these are not cared for (maintained and watered) during establishment. Consequently the City needs to increase budget allocation for tree planting to include resources for this establishment period. This approach to tree management should include a community consultation programme that will advise and educate the community about the reasons for tree removal and the replacement planting process.

5.3 Management of street trees

Across the City of Ryde, trees have been planted in street verges, within road reserves and in some instances in roads themselves to provide shade and improve the look of or screen the road network. During the community consultation process for the preparation of the Urban Tree Management Strategy Discussion Paper published in 2009 (refer to section 2.2 above), the community expressed the view that street trees are very important and that the highest ranking change the community would like to see within the City is the planting of more street trees.

The increasing urban nature of the City means the pressures on street trees are increasing (refer to section 4.2.1 above). Council has responded to this in the past with the Street Tree Planting Program (refer to section 2.2 above), nonetheless, many street trees are continually being removed as result of urban consolidation, community requests, risk management, poor vitality, structural condition or death of the trees often caused by the difficult growing conditions.

The preparation of a comprehensive and accurate tree inventory (as referred to in section 4.3.1 above) will identify and document all street trees within the City of Ryde providing an understanding of the species composition and number of trees under its management and the condition of these trees. A tree inventory will also inform the preparation of the Street Tree Masterplan. This Masterplan will:

- Enable street tree management to be proactively planned and works programmed,
- Identify key areas for the staged removal and replacement of street trees,
- Pinpoint new planting opportunities,
- Specify standards for the pruning and lifecycle management of street trees,
- Adoption of the Statewide Best Practice Manual: Trees and Tree Root Management (2003) as the guiding tool for street tree species selection, and
- Provide the necessary information to facilitate budget allocation for the management of the street tree population.

Trees need room to grow. Conflict between tree roots and other urban infrastructure is a major issue in the management of street trees. Competition for space both above and below ground limit

the size and vitality of a tree, and in so doing both decrease the benefits the tree can provide and reduce its useful life expectancy. Managing this conflict is costly because this involves repairing the infrastructure (eg. path, kerb or wall), works to the tree (eg. crown pruning, root pruning or installing root barriers) and potentially removing and replacing trees more frequently.

Fixing the damage will always have an impact on the tree (eg. pruning for clearance around services lines removes leaves which the tree needs for photosynthesis, may lead to decay at the pruning wound, reduces the amount of shade the tree provides and may make the tree aesthetically unattractive). The City needs to adopt an inter-departmental approach to the management of street trees to identify the main sources of conflict and formulate ways of avoiding conflict and damage in the future. This approach should include education on how trees can be adversely affected by construction such as public works and set standards for distances between infrastructure and tree plantings (eg. between street light poles and trees, and vehicular crossovers and trees) to avoid potential future conflict.

In addition, an education tool kit should be prepared to provide information on the value of street trees and encourage the community to have an active role in the management of street trees within the City.

5.4 Tree selection – locally endemic, native or exotic?

Mature trees are significant environmental and community assets regardless of whether they are native or exotic. Tree species selected for planting within the City may be locally endemic to the City of Ryde area, native (from other parts of Australia) or exotic (introduced from overseas).

There is a belief amongst some members of the community that only locally endemic tree species should be planted along the streets and in parks within the City. There are many benefits of planting these trees: they provide shelter and habitat for fauna, form or enhance wildlife corridors, help conserve biodiversity and act as a food source. In addition they have adapted over time to the local climate and soils.

Development of the City including road and footpath construction, and housing development has, however, changed the natural environmental conditions in many places, for example, by disturbing the original soil profile. This, together with the difficult growing environment into which the trees are planted (refer to section 4.2.1 above) is unfavourable to the success of planting some locally endemic tree species particularly as street trees. Locally endemic or native trees simply may not be suited to the environmental conditions of the planting site.

This means that although there are benefits to the use of locally endemic species in our streets and parks, there will also be times when native and or exotic tree species will provide a more appropriate solution.

The key to tree species selection in all cases is an understanding of the location and the role to be fulfilled by the tree - it is important to put the right tree in the right place. The design of a streetscape or park must include an analysis of the site and definition of the function of the tree. This could be, for example, predominantly as habitat or a cultural planting for visual appeal such as Eastwood Town Centre.

5.5 Management of significant trees

In 2003, the City initiated the preparation of the City of Ryde Significant Tree Register that would list all 'significant trees' (as either a single tree or a larger grouping of trees) that possess values relating to their visual, historic, botanical, cultural, commemorative or other significance.

A Significant tree is a tree considered important due to one or more of the following factors:

- prominence of location,
- contribution as a component of the overall landscape for amenity or aesthetic qualities,
- a part of a curtilage to a significant structure,
- importance or uniqueness of the species including rarity, threatened species etc,
- historical or cultural landscape planting, including both Aboriginal and European heritage,
- age, and
- habit.

During the initial community engagement for the preparation of the Urban Tree Management Strategy Discussion Paper published in 2009 (refer to section 2.2 above), it was clear that the community wanted to see improved management of significant trees across the City of Ryde.

A review of the Significant Tree Register is needed. This scope of this review should include the process for nomination of trees on private land for inclusion on the Register, changes to the Planning Scheme to ensure registered trees are protected and may not be altered, pruned, injured, destroyed or removed without a permit.

Following a review of the Register, the responsibility of maintaining the Register must be managed by the Operations Manager or their delegate. In addition, reference should be made to the Register during the assessment of Development Applications and protection conditions should be applied as required.

5.6 Impact of development on trees

Pressure on open space increases as the population within the City of Ryde grows. In the past decade, tree populations in Australian cities have declined as a result of the size of front and back yards reducing creating a overall loss of private open space. In-fill and high density urban development has lead to blocks with little or no room in which to plant large trees. In many cases, narrow streets and wide vehicular crossovers restrict tree planting or accommodate the planting of small trees only. Pavement and road infrastructure and the lack of below ground space prevent trees

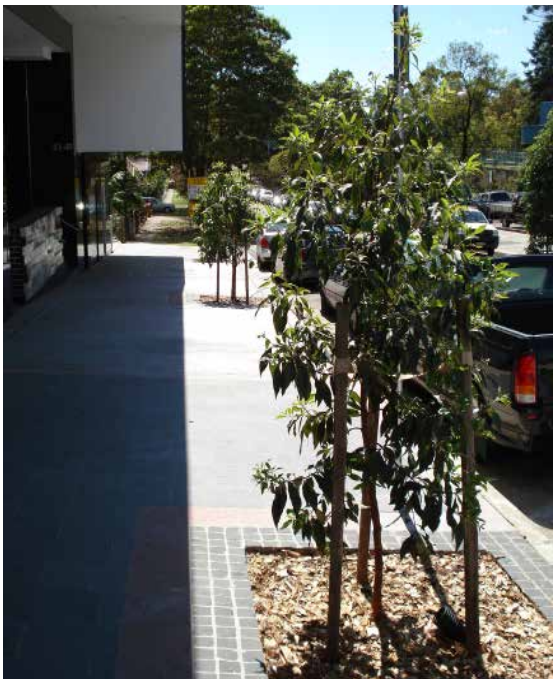
growing to their full mature size (Moore, 2009).

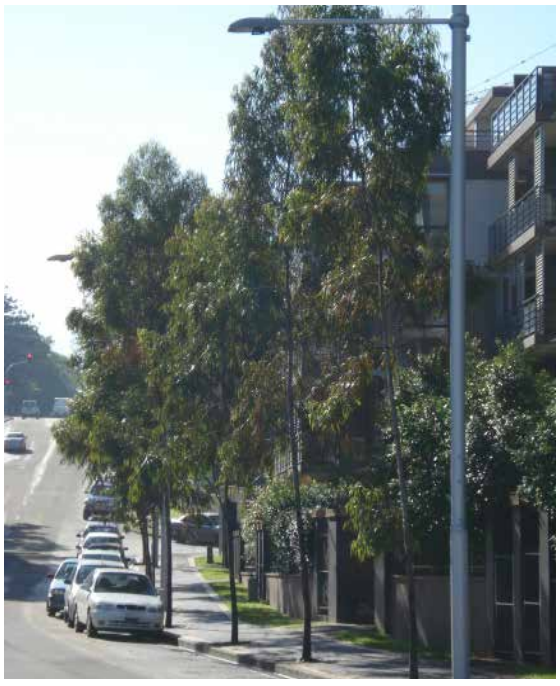
A key challenge for the City of Ryde is how to achieve growth, change and development while maintaining the community's existing lifestyle which includes the benefit of the City's green outdoor spaces.

Each year the City of Ryde receives hundreds of development applications from the community to change or improve their private land. There are regulatory controls in place that guide development across the City (refer to section 2.2 above) including controls placed on the removal and pruning of trees and the alteration of soil levels close to trees. These controls apply irrespective of whether the tree is on private or public land. All development applications are assessed, managed and approved by the City's planning and environment department with referrals made to specialist officers in the areas of landscape architecture, engineering and arboriculture. Communication between departments is critical to ensuring the important of trees as an integral part of urban infrastructure is recognised and the urban forest is sustainably managed.

Trees need space, both above and below ground in which to grow. This must be considered when assessing development applications. Onsite solutions in addition to finding alternative places to plant large canopy trees such as parks, understanding that the loss of trees on private land may be compensated for by planting on public land, budgeting for and allocating resources for the proper management of trees on public land, and generally planting trees on public land with more attention to ensure they establish and reach maturity.

It is also important to protect trees on development sites. All developments should be designed to ensure the preservation and the long term viability of trees categorised as having a high or





medium retention value. Tree retention values shall be used to guide site analysis, site planning and development design.

Developments should be designed to avoid or minimise potential conflict between trees and proposed structures. The future growth of trees, both above and below ground should be considered when proposing to construct a structure close to a tree.

The crown, trunk and roots of a tree can easily be damaged during the demolition and construction process. Trees take years to grow but can be injured or killed in a very short time. It is usually not possible to repair trees stressed or injured through construction damage. Accordingly the protection of trees on development sites must be planned and managed and all protection measures must be installed before any works begin. The protection measures must be maintained and managed throughout the entire construction process. The City of Ryde will adhere to ***Australian Standard 4970 – 2009 Protection of trees on development sites*** and require developers to do the same by including tree protection measures in development consent conditions.

5.7 Biodiversity conservation

The City of Ryde attributes a high value to the local environment and aims to encourage more sustainable and environmentally sensitive development. The City believes that environmental preservation, conservation and enhancement serve to increase biological diversity at a local level which will in turn impact larger scale bio-systems.

The City faces the same problems in relation to biodiversity as most other urban environments: how to maximise native biodiversity and how to manage problem species such as weeds or invasive introduced species.

The City contains highly valued bushland and these areas have become a significant component of the local landscape. They also have an important role in the protection of critical habitat areas for endangered or threatened species. Flora and Fauna Studies carried out by Biosphere (2007 and 2008) identify the need to manage bushland reserves as areas of conservation for both native plants and animals. They suggest this can be achieved by:

- improving the habitat diversity and value of bushland reserves;
- improving shelter sites – ensuring dead trees are only felled where they are considered dangerous to park users and private property;
- away from the edges of bushland reserves, leaving fallen logs and branches for ground shelter for native terrestrial fauna; and
- taking steps to create buffers between bushland reserves and the urban interface by planting a dense "wall" of locally endemic native plants that can tolerate greater physical damage and exposure.

Outside of bushland reserves, biodiversity conservation can be enhanced by:

- creating and enhancing vegetation corridors across the City;

- creating suitable habitat by selecting tree species for street planting that provide habitat value (either as dense canopy, food or nesting sites); and
- encouraging residents who live in areas between reserves to plant suitable trees and shrubs to assist with the creation of sympathetic habitat and vegetation corridors.

The urban forest includes many different types of corridors located across the City. Types of corridors include:

- wildlife corridors;
- remnant corridors;
- natural corridors, such as riparian corridors; and
- planted corridors that include tree lined streets and urban green belts.

Vegetation or "green" corridors usually comprise more than one type and have multiple functions. Accordingly, although many studies commissioned by the City of Ryde have highlighted the need to improve corridor connections across the City generally, the most important function and purpose of a corridor must be first identified. This will inform subsequent selection of tree species and planting approach. The most significant function will not always be habitat conservation. For example, it may not be suitable to plant locally endemic native tree species as street trees in some locations close to bushland reserves and a compromise will need to be reached whereby an exotic tree species that does not compromise overall bushland values is selected.

The IOSP suggests the highest priority should be given to:

- completing local missing links in existing corridors that would significantly extend open space;
- enhancing links in areas with limited open space; and
- creating links where this would enhance natural values.

The IOSP also advocates:

- preparation of a Biodiversity Plan for the City;
- employing an extended open space corridor network to enhance bushland viability, diversity and connectivity across the whole of the City; and
- enhancing native fauna habitat connectivity (and thus reducing habitat isolation and fragmentation) through extending the natural and recreational corridors (a green web), linking to a network of selected streets (major walking and cycling routes) that provide continuous native tree canopy (a green grid).

5.8 Climate change

Climate change has been described in general as any significant, long-term change in weather patterns caused by an increase in the earth's average temperature. The rise in temperature is considered to be the result of increased greenhouse gases in the earth's atmosphere. The cause of the increased greenhouse gases is still open to debate but irrespective of this, the likely impacts are

unavoidable (Echelon, 2010).

The CSIRO has predicted that by 2030 temperatures in NSW will become warmer, with more hot days and fewer cold nights and there will be:

- an increased peak summer energy demand for cooling;
- reduced energy demand in winter for heating;
- an increase in annual heat-related deaths in those aged over 65;
- a potential increase in the spread of vector/water/food borne diseases;
- further stress on water resources;
- more frequent droughts;
- a greater risk of fire; and
- an increase in flash flooding with a greater number of intense rain events (Echelon, 2010).

These changes will compound existing urban stresses such as air pollution and the heat island effect. The City of Ryde needs to incorporate potential climate changes into its plans for the future.

While the impacts of climate change on the urban forest are not fully understood, there is increasing industry research that has identified a number of key environmental changes that will impact the Urban Forest within the City. The predictions indicate that the already harsh growing environment for trees will get worse. This will affect tree survival, health and vigour. For example, prolonged drought places trees under considerable stress. Stressed trees are more susceptible to insect and pathogen attack.

Permanent climate change will therefore affect the long term sustainability of the urban forest within the City. Increases in average temperatures will lead to changes in biodiversity and ecosystems which will have an impact on plant and animal species. As temperatures rise, the numbers of insects attacking street trees are also likely to rise and the period over which they graze is likely to become longer (Moore, 2011). Climate change will also affect tree management - increased storm events and more frequent high winds could see higher rates of damage caused to and by trees (eg. wind throw and limb failure), and tree species with a wider natural distribution, higher adaptation to environmental stress and tolerance to increased heat and drought will need to be selected for new plantings. Climate change will favour some plant species whilst have a negative impact on others, for example Echelon (2010) points out that higher wind speeds may lead to a loss of flora species over time.

However climate change may also have subtle benefits – for example, provided sufficient water is available, warmer temperatures may allow more rapid street tree establishment (because it will facilitate rapid root growth) and therefore establishing trees will have an impact on the streetscape more quickly (Moore, 2011).

Trees have a role in both mitigating and adapting to climate change. Trees mitigate climate change directly by sequestering greenhouse gas emissions and indirectly by reducing emissions

as a consequence of evapotranspiration and the cooling effects of their shade (Plant, 2009). Strategically placed trees can reduce energy demand by lessening the need to use air conditioners in summer. Carbon sequestered by trees planted as part of new road projects will partially offset the carbon produced by cars using the roads. A study carried out by the Australian National University found that "suburban street trees are more effective than native forests at capturing carbon because of their relative youth" (Moore, 2009)

The IOSP recommends the preparation of strategies to adapt the City's open space to potential climate change including:

- increasing available shade to combat temperature increases in all parks, and
- extending tree planting in parks, streets and urban open spaces to combat heat island effect.

Brisbane City Council's Neighbourhood Shadeways and Subtropical Boulevards programme provides an example of how trees can mitigate and alleviate the impacts of climate change. In 2008- 09, 11,430 new street trees were planted in Brisbane with the aim to increase tree shade/canopy cover to 50% along footpaths and bikeways in areas of the city where high residential dwelling density was proposed. The new trees will make the areas more attractive, increase use (making residents more active and likely to use public transport), and enhance open space provision and connections. In relation to mitigation:

> *"If shady pathways helped to reduce the number of kilometres of private car travel by just 1/100th annually, the greenhouse gas emissions avoided is estimated to be around an additional 25 % of what is sequestered directly by the trees themselves" (Plant, 2009)*

Conversely if the City of Ryde lets its urban forest die, the carbon they sequester will be released into the atmosphere.

The role and value of trees in both mitigating and alleviating the effects of predicted climate change needs to inform management practices across Council departments. Ensuring the sustainability of the urban forest canopy should be included in the City of Ryde's plans for managing climate change and future development projects. This includes allocating resources (management, labour, energy, water and growing space) both to plant new trees and to ensure trees within the City establish, are healthy, well maintained and grow to maturity.

5.9 Risk management

Trees provide economic, environmental and social benefits to society. They are a fundamental part of the urban infrastructure. Although they are appreciated by most people, they are viewed as a nuisance by some because of conflicts between trees and built infrastructure, including footpaths, roads, buildings and utility infrastructure. The tree management team and tree maintenance staff spend much of their time and budget trying to resolve these conflicts and abate potential hazards caused by public trees, such as roots lifting pavements, fruit drop causing slip hazards and branch drop.

The benefits of trees are often subtle but the damage they cause is highly visible and can be dramatic. Risk management aims to limit damage or injury caused by trees whilst maintaining the

benefits provided by trees.

The City of Ryde, like all other tree owners, has a legal duty to take reasonable steps to manage the risks associated with trees under its control. It is expected to foresee likely risks and prevent them by strategies or actions. The City must therefore have a planned and systematic approach to the management of its trees. The first step is the preparation of a public tree inventory. Without this the City is trying to manage an unknown entity. With this information the City will be able to prioritise proactive work based on hazard evaluation and risk assessment.

This risk management approach should inform tree management practices, for example by implementing strategies for putting "the right tree in the right place", providing more space for tree roots through design and planning, or making the space right by modifying site conditions.

The City of Ryde will not indiscriminately remove trees in order to eliminate risk or conflict with other urban infrastructure.

Using a "whole tree management system" may be more cost effective in the long term in reducing or preventing hazards. Such a system considers nursery practices, site planning, site preparation, planting techniques and formative pruning of young and semi-mature trees. For example, root deformities caused by poor nursery practices have been shown to be the cause for many tree failures. Trees with good root systems and good anchorage are less likely to fail in very wet weather, severe windstorms or an uncommon wind direction (Kenyon, 2002). Expenditure on trees is therefore part of the risk management process.

Trees are natural assets unlike most other public infrastructure. They warrant the expenditure of resources in their selection, installation and maintenance just like any other asset owned by the City. Trees appreciate in value and provide long term benefits. Because the benefits of trees are hard to quantify these benefits are often ignored and trees are seen as a cost, not an asset. Accordingly removing a tree may provide a short term solution to a problem, but at the long term detriment to the urban landscape and quality of life of the residents in the City of Ryde.

5.10 Cultural differences

The community in the City of Ryde is culturally diverse including people born in China, United Kingdom, Hong Kong, South Korea and India, Italy, Greece and many other countries. This provides a unique social character that is the foundation for a vibrant and engaged community. However this diversity also provides a unique challenge for the City of Ryde in urban planning, the management of trees and open space because of the cultural differences in the perception and attitudes in relation to the role and value of trees, natural areas and parks.

Having an understanding of the cultural approaches to tree selection and placement is necessary to allow for an expansion of the urban tree canopy in Ryde. The challenge the City of Ryde faces is how to plan for the enhancement and expansion of an urban tree canopy in light of the City's cultural diverse population.

Education is a critical component of the future implementation of this Plan.

6. Implementation Plan

The Implementation Plan sets out the actions by which the Tree Management Plan will be realised.

6.1 City Outcomes

The City of Ryde is managed under seven City Outcomes listed in the Ryde 2021 Community Strategic Plan. To maximise the integration of the actions and recommendations of this Plan, each action is linked to one of the 21 City Strategies that underpin the priority setting for Council. A listing to all relevant Outcomes, Goals and Strategies are listed below.

Outcome	Goal	Strategy
Outcome 1 - **A City of Liveable Neighbourhoods**	A - All residents enjoy living in clean, safe, friendly and vibrant neighbourhoods	1. To create welcoming neighbourhoods that are inviting, safe and enjoyable. 2. To support a variety of uses and activities in our neighbourhoods, which contribute to a desirable lifestyle. 3. To collaborate with our partners to increase social and recreational opportunities in our neighbourhoods.
	B - Our community has a strong sense of identity in their neighbourhoods and are actively engaged in shaping them	1. To plan and design our neighbourhoods in response to our community's needs, wants and sense of belonging. 2. To encourage and support local identity and character in our suburbs and neighbourhoods and protect our local heritage.
	C - Our neighbourhoods thrive and grow through sustainable design, planning and regulation that support community needs	1. To design our City to reflect the unique character, identity and housing needs of our community. 2. To pursue sustainable design and adopt best practice in the planning of our suburbs and neighbourhoods. 3. To create active public places and spaces through good planning and design.

Outcome	Goal	Strategy
Outcome 2 - **A City of Wellbeing**	A - Our residents are encouraged and supported to live healthy and active lives	1. To offer a range of cultural, sport, recreational and leisure facilities to meet the needs of all. 2. To provide a variety of activities that encourage social interaction and stimulate every day well being. 3. To collaborate with our partners to encourage more people to lead healthy and active lives locally.
	B - All residents feel supported and cared for in their community through the provision of ample services and facilities	1. To provide services and facilities that meet the needs and challenges of all our community, throughout the cycles of their life. 2. To collaborate with our partners to offer the whole community a range of quality services and facilities. 3. To influence decision makers to provide health and welfare services that meet the needs of all our community.
	C - Residents feel secure and included in an environment where they can connect socially and are supported by their neighbours.	1. To encourage a healthy, happy, inclusive and active community where neighbours look out for each other. 2. To provide safe community spaces and places for people to meet and get to know each other.
Outcome 3 - **A City of Environmental Sensitivity**	A - Our residents, businesses and visitors collaborate in the protection and enhancement of our natural environment.	1. To raise awareness in our community on the future challenges to our natural environment and the actions required to mitigate them. 2. To actively collaborate with our community and businesses to care for and enhance our environment. 3. To provide incentives which encourage all to enhance, preserve and protect our natural ecosystems.
	B - To encourage and enable all our residents to live a more environmentally sensitive life.	1. To raise awareness in our community on the future challenges to our natural environment and the actions required to mitigate them. 2. To actively collaborate with our community and businesses to care for and enhance our environment. 3. To provide incentives which encourage all to enhance, preserve and protect our natural ecosystems.
	C - As we grow, we protect and enhance the natural and built environments for future enjoyment and manage any impacts of climate change.	1. To lead by example and demonstrate environmental sensitivity in all that we do. 2. To work collaboratively with neighbouring councils to develop measures to protect our natural environment and bio-diversity. 3. To take a leadership role and enhance our capacity to manage any impact of climate change and protect our community.

6.2 Service accountabilities

The City of Ryde has identified Service Departments within Council that are charged with the delivery of the Plan's implementation are identified under the heading of Accountability using the following numbering.

Accountability		Service Department
80	Public tree development & management	Operations
81	Public tree delivery management	Operations
82	Public tree arborist service	Operations
83	Private & public tree regulation service	Operations
168	Community environmental education	Environmental Health and Building
169	Corporate environmental education	Environmental Health and Building
143	Development Application service	Assessment
145	Unauthorised activity investigation	Environmental Health and Building
135	Land use plans and controls development	Strategic City
70	Passive recreation development and management	Operations
73	Natural bushland development and management	Operations
77	Bushcare volunteer management and development	Operations
79	Open space planning development	Operations
52	Customer centre(s) service	Customer Service
18	Insurance and risk management	Risk and Audit
45	Community engagement development and management	Customer Service
61	Public Domain (Centres) development and management	Strategic City

6.3 Implementation priority

Each action in the Action Plan has been given a priority rating for delivery, as follows:

H = High: top priority. Where there are no impediments to its delivery this action should be completed within one to three years.

M = Medium: this action should be completed within four to seven years.

L = Low: this action is important but not urgent. This action should be completed within seven to ten years.

O = Ongoing: this is a recurrent action that may be regularly repeated.

6.4 Key performance indicators

Each action has been allocated a key performance indicator (KPI). An action will be completed when the KPI has been met. An abbreviation for each KPI is listed in the Action Plan. Where more than one KPI is listed they appear in alphabetical order. The abbreviations used are set out below.

Abbreviation	Key Performance Indicator	Explanation
AP	Aerial Photography	To identify changes in urban forest canopy cover across the City when compared over a number of years.
CC	Community Correspondence	Communications received from the community to identify trends in satisfaction or issues in tree management.
CW	Consultation Workshops	Where the City wants focussed qualitative feedback on the success or otherwise of implementation it may choose to convene a workshop of relevant stakeholders, internal staff an/or external experts to determine the extent of performance on key actions.
RC	Regulatory Compliance	To establish changes in community perception of the importance of the urban forest and compliance with regulatory controls in relation to the removal and pruning of trees.
QS	Questionnaire Survey	This may be an omnibus telephone survey of the community carried out regularly to elicit community satisfaction on all Council services or a targeted urban forest related topics conducted by Council.
PS	Photographic Survey	This is most commonly used to identify changes in the landscape, associated with targets for enhancement of urban forest canopy conservation and enhancement.
FS	Field Study	In field investigations are most commonly used to determine environmental changes and to monitor changes to the urban forest.
UFE	Tree Management Education	Number of external and or internal education programs.
DR	Documentation Preparation and or Review	Review of City of Ryde documentation.
UFA	Tree Management Assessment	This KPI is a measurement of the increased awareness of urban forest enhancement during development assessment
TP	Trees Planted	Number of trees planted per year on public land

In many cases, several KPI measures can be applied at the same time; for instance an action that requires both quantitative data gathering (eg. usage) and qualitative feedback (eg. park experience and satisfaction) a combined exit survey, usage survey and photographic survey can be carried out in the same place over a period of a few hours.

6.5 Action Plan

This section sets out in an Action Plan the actions by which the issues and challenges in managing the urban forest within the City of Ryde will be resolved. The Action Plan comprises a series of tables that identify the:

- work to be undertaken,
- relevant outcome and goal from the Ryde 2021 Community Strategic Plan,
- priority in implementing the action (high, medium or low),
- the service group within the City of Ryde accountable for the action
- Key performance indicator for each action.

The Action Plan also identifies where further research or additional information is required.

The Action Plan is divided into five key management areas which reflect the guiding principles of the Tree Management Policy (referred to in section 2.2 above), as follows:

- Tree protection;
- Tree selection and planting;
- Tree asset management (including risk management);
- Tree removal and replacement; and
- Community consultation and involvement.

Tree Protection

The City of Ryde recognises the importance of trees in the urban environment and for that reason it will manage trees throughout the City irrespective of whether they are located in streets, parks or on private properties. The City also recognises that trees on public land play a critical role in ensuring the urban forest is an intergenerational asset.

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
A1	**PROTECTION OF TREES WITH DEVELOPMENT CONTROLS**				
Maintain the City of Ryde's focus on the preservation and protection of existing trees within the City as set out the development control framework governing the removal, pruning and alteration of soil levels close to trees within the City.					
a	Development Controls	1.C.2	Ongoing	135	DR
Periodically review the Development Control Plan (DCP) Part 9.5 (Tree Preservation) and the companion Technical Manual to ensure ongoing effectiveness and suitability for the urban forest management approach of Council. Review all associated procedural documentation pertaining to development controls impacting the urban forest every three years or as required to ensure ongoing effectiveness.					
b	Replacement planting	3.B.2	Ongoing	80, 143	RC
Condition any tree removal with replacement tree planting or other suitable compensatory action to ensure ongoing enhancement of the urban forest canopy and to mitigate loss of canopy. All replacement planting to comply with the requirements as defined in the Tree Management Technical Manual.					
c	Compliance	1.C.3	High	83,	RC
Implement a system that will improve Council's response to breaches of urban forest regulations. This should include process definition, allocation of responsibilities that will aid Council in prosecuting breaches of all relevant development controls. Establish protocols, delegations and ensure staff undertake relevant training to enable proactive management of the urban forest through issue of penalty infringement notices to the responsible individuals or business for breaches of the City's urban forest regulations. Review protocols, delegations and staff training to enable Regulatory Services and Tree Management Officers increased ability to investigate and prosecute vandalism attacks to trees.					
d	Community education	1.B.2	High	83	UFE
Compile and publish educational material to inform the community about DCP Part 9.5 (Tree Preservation) , how apply for tree works under the DCP Part 9.5 (Tree Preservation) and the penalties for infringement of DCP Part 9.5 (Tree Preservation). Expand the tree management section on the City's website to include this information.					

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
A2	**PROTECTION OF TREE ON DEVELOPMENT SITES**				
The City of Ryde will ensure that the development application submissions will include all necessary information to allow an assessment of the potential impacts of trees on the development site and on adjoining private and public land. **The City of Ryde recognises the need to achieve growth, change and development while maintaining the community's existing lifestyle which includes the benefit of the City's green outdoor spaces.**					
a	Development Controls	1.C.2	Ongoing	83, 143	DR
Review existing development application submission requirements under all Parts of the City's development controls as listed in DCP 2010 to ensure they complement the provisions of DCP Part 9.5 (Tree Preservation) and all companion documents such as the Tree Management Technical Manual.					
b	Development Application assessment	1.C.2	Ongoing	143,83	UFA
When assessing Development Applications, Council will, in alignment with the Assessment Best Value Review: • Recognise the importance of trees and ensure the urban forest is sustainably managed; • Recognise contribution trees make to the character, value and appearance of a neighbourhood; • Consider the requirements (above and below ground) of both existing and proposed trees on the development site. Ensure that all Development Applications and arboricultural reports for sites upon which trees are located will comply with the provisions of the Tree Management Technical Manual. Establish processes to ensure managers and staff from all departments recognise the importance of sustainably managing the urban forest and the contribution trees make to the character, value and appearance of a neighbourhood. Implement an efficient referral process for the assessment of trees in development applications. Modify development application conditions of consent to include tree protection measures on all sites upon which trees with medium to high retention values are located. Ensure ongoing enforcement of development application conditions of consent governing the management and protection of trees on development sites.					

Note - The NSW Department of Planning and Infrastructure is currently undertaking a review of the NSW Planning System and this may result in substantial changes to the existing planning framework. Future amendments to this Plan may be required in response to these changes.

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
A3	**PROTECTION OF STREET TREES NEAR OVERHEAD UTILITY AND SERVICE LINES**				
The City of Ryde will actively reduce conflicts between street trees and overhead service lines.					
a	Planting opportunities	1.B.2	Medium	80	TP
In accordance with the tree selection principles listed in the Street Tree Masterplan, identify locations for large tree species plantings, such as broad median strips, wide street verges or roundabouts, where there are no overhead services lines to ensure large trees continue to be planted within the City.					
b	Aerial Bundled Cabling	3.B.2	Low	80	CC
Investigate and discuss with all relevant service providers the installation of Aerial Bundled Cabling in select streets throughout the City.					
c	Agreements with Service Providers	3.B.2	Ongoing	80	CC
Lobby energy companies to improve their clearance pruning practices and adhere to all relevant Australian Standards for tree works. This may include the establishment of Memorandums of Understanding or agreed service levels for the pruning of Ryde's street trees by energy company's contractors.					
A4	**PROTECTION OF SIGNIFICANT TREES ACROSS THE CITY**				
The City of Ryde will preserve and protect existing trees of heritage, cultural or ecological significance throughout the City. The City of Ryde will gather all information on a single register and use this register to promote community awareness and ensure better and consistent methods of protection of the trees in the future.					
a	Significant Tree Register	3.B.3	High	79, 80	DR

Review and update the Significant Tree Register. This review should include the following topics as a minimum:

- Updating details of the vitality of existing trees on the register;
- Invite and assess new applications for registration;
- Nominate and add trees on public land to the register;
- Revising the protocols for nomination and assessment of significant trees;
- Considering the significance categories;
- Revising the assessment criteria; and
- Establishing an assessment expert panel.

Ongoing management of the Significant Tree Register is necessary to maintain its currency, authenticity and of ensure its effectiveness. Responsibly for the ongoing management and monitoring of the Register must be clarified.

Ensure all Council departments and the community have access to the Significant Tree Register.

Educate Council staff and set up procedures to ensure that significant trees are appropriately managed during any development and construction.

Use the Significant Tree Register review as a tool to promote community awareness about the heritage, cultural and ecological value of trees.

Tree Selection and Planting

The City of Ryde recognises the importance of the urban forest, and the environmental, economic and social benefits of trees. The urban forest is measured as a percentage of tree canopy cover of the total area of the City. An appropriate tree canopy density is necessary for significant benefits to accrue.

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
B1	**INCREASING THE CANOPY COVER**				
The City of Ryde will act to maintain and increase the canopy cover by 15% by 2030 through a program of tree planting in the City's streets and open spaces while encouraging the community to plant suitable trees in their private gardens.					
a	New tree plantings	3.B.2	Ongoing	80	TP
Identify opportunities and constraints for additional tree planting throughout the City and plant new trees accordingly. Identify opportunities for additional tree planting in parks and streets to develop and enhance vegetation, natural and recreational corridors to provide a continuous tree canopy and for climate change adaptation. In accordance with the IOSP and the Street Tree Masterplan, give priority to: • Completing local missing links in existing corridors that would significantly extend open space; • Enhancing links in areas with limited open space; • Creating links where this would enhance natural values; • Enhancing bushland viability, diversity and connectivity across the whole of the City; • Enhancing native fauna habitat connectivity; • Increasing available shade to combat temperature increases in all parks; and • Extending tree planting in parks, streets and urban open spaces to combat heat island effect. Promote and fund tree planting programs for the City.					
b	Community awareness	3.B.2	Ongoing	80	UFE
Promote community awareness about the benefits of trees and the importance of managing and increasing the urban forest. Promote tree planting on private land and publish guidance on suitable trees (both exotic and native species) to plant in private gardens in City publications and website. Develop education campaigns to make residents aware of the conservation value of the bushland. Encourage local conservation groups to work with Council to protect bushland areas.					

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
B2	**STREET TREE PLANTING**				
The City of Ryde will plan and manage street trees throughout the City to enhance the quality of streetscapes, and the amenity and character of neighbourhoods.					
a	Street Tree Masterplan	3.A.1	High	79	DR
Prepare a Street Tree Masterplan which will set out: • principles for planting design and location; • species selection guidelines; • Species lists for links for selected streets adjacent to and between bush reserves to provide a "green web" part of wildlife corridors within the City. • a priority listing for tree replacement for all streets in the City; • potential new planting opportunities; and • maintenance standards for use by Council staff and external maintenance contractors. • Plant quality, planting and maintenance specifications for street tree planting. • Priority for implementation Ensure developers are aware of the Street Tree Masterplan and, where appropriate, include as Development Application conditions of consent a requirement to plant street trees in accordance with the Masterplan. Cross reference to the Public Domain Technical Manual for street tree masterplanning in Town Centres. Provide adequate annual funding for the implementation of the Street Tree Masterplan.					
B3	**PARK TREE PLANTING**				
The City of Ryde recognises parks and bush reserves as being important: • **locations for large and broad canopy tree planting;** • **for the preservation of remnant vegetation;** • **for conserving a diversity of tree and shrub species which attracts wildlife and for providing low, medium and high canopy cover for native fauna;** • **for the protection of trees and sites classified as being vulnerable, threatened or endangered ecological communities within the City;** • **for the conservation of habitat for native fauna and fauna.** • **part of vegetation and wildlife corridor networks across the City.**					
a	Planting opportunities	3.A.1	High	80, 81	TP
Identify opportunities for additional tree planting in parks to develop and enhance vegetation, natural and recreational corridors to provide a continuous tree canopy (a "green web"), and for climate change adaptation. Set up procedures for the selection, placement and location of trees within parks and bushland reserves; and ensure all park upgrades and new park identify opportunities for planting large canopy trees. Provide adequate annual funding for the planting of trees in public open space. Annually review tree planting and maintenance budgets and modify as required.					

Ref	Topic / Action	Outcome	Priority	Accountability	KPI
b	Plans of Management	3.A.1 and 2.C.2	Ongoing	79	DR
Ensure Plans of Management: • Consider the environmental and social benefits of trees; • Recognise the need to maintain and enhance the urban forest canopy; • Preserve existing large tree plantings; • Identify new large tree planting opportunities in locations appropriate to the trees mature size; and • Implement the recommendations relating to urban vegetation corridors and habitat networks set out in the IOSP and the Street Tree Masterplan.					
c	Open Space Maintenance and Improvements	2.C.2	Ongoing	80, 81,82, 70,73	PS / FS
Ensure the operations/parks maintenance department/grounds staff/internal maintenance practices are carried out and recognise the importance of parks and bushland reserves as areas of conservation for native flora and fauna and provide urban forest canopy. Ensure parks upgrades, new park projects and maintenance practices provide and retain a diversity of tree and shrub species within parks to attract wildlife and contain areas that provide contiguous layers of low, medium and high canopy cover for biodiversity conservation. Identify parks and areas within which: • shelter sites are improved including ensuring dead trees are only felled where they are considered dangerous to park users and private property; • away from the edges of bushland reserves, fallen logs and branches are left for ground shelter for native terrestrial fauna; and • buffers between bushland reserves and the urban interface are created by planting a dense "wall" of locally endemic native plants that can tolerate greater physical damage and exposure.					
d	Community awareness	3.B.2	High	80	CC / CW
Educate the community on the importance of providing space for large canopy trees and remnant vegetation (including endangered ecological communities) within the City's parks and parks and bushland reserves as areas of conservation for both native flora and fauna.					

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
B4	**TREE SPECIES SELECTION AND PLANT QUALITY**				
The City of Ryde will incorporate ecologically sustainable principles in the selection of species for replacement and new tree plantings, where appropriate. **The City of Ryde will require all trees planted within the City to be good quality tree stock in accordance with current industry best practice.**					
a	Species selection	3.A.1	High	80	FS / DR
Research and compile a list of tree species suitable for planting throughout the City given the current and predicted climate and environmental conditions that builds upon the species selection lists contained within the Street Tree Masterplan. Map existing and potential vegetation corridors throughout all open space within the City, determine the principle function of each corridor and determine appropriate tree species lists for each. Determine the extent of buffer planting around bushland reserves and plant appropriate locally endemic species within this catchment area. Within natural areas plant tree species that naturally occur in those reserves.					
b	Tree stock quality	3.A.1	Ongoing	80, 81	TP
Ensure all tree stock supplied for planting on public land conforms with AS2303 tree stock for landscape use and the Tree Management Technical Manual.					
c	Stock production	3.C.1	Medium	73,80	UFE / FS
Establish and operate a native plant nursery to grow tree and other plant stock for planting throughout the City and grow all stock to enable supply to meet best practice guidelines. Encourage community participation in the nursery and the planting of locally grown trees to be planted on private land to improve habitat for native fauna. Collect and grow trees at the nursery from native plant seed sourced from within the planting catchment area.					
d	Community awareness	3.A.1	High	73	UFE
Undertake and community education programs to inform the community about the existence of the Tree Management Technical Manual and the importance of planting good quality tree stock. Promote awareness of suitable native trees to plant on private land to encourage habitat conservation for native fauna, and create and enhance vegetation corridors throughout the City. Encourage community participation in the community nursery					

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
B5	**TREE INSTALLATION**				
The City of Ryde recognizes the importance of correctly planting and maintaining new tree stock to: • **the long term vitality and structural condition of the tree; and** • **the aesthetic success and benefits of the tree in the long term.**					
a	Planting	1.B.2	Ongoing	143, 83	FS
Ensure the City and developers conform to the planting specification set out in the Tree Management Technical Manual and the Street Tree Masterplan. and the Public Domain Technical Manual and other procedures, processes and responsibilities as defined in the Development Assessment System of NSW. Use a risk management approach to inform tree management practices including: • determining the right tree for the right place every time; • providing more space for tree roots through design and planning; • investigate engineering solutions to avoid or minimize future interactions between trees and other urban infrastructure; and • making the space right by modifying site conditions.					
b	Integrated management	1.B.2	High	80	FS / UFE
Determine processes to ensure managers and staff from all departments recognise trees as assets with equal importance as other public infrastructure and require space in order to survive, remain healthy and provide long term benefits. Educate managers and staff within all departments about the tree biology and how the planting environment affects tree health.					
c	Tree establishment	1.B.2	High	81 , 61	FS
Budget for and allocate funding for maintenance works (such as mulching, watering, formative pruning) necessary during a minimum of 104 week establishment period for trees planted on public land. Include a requirement for maintenance during a minimum of 104 week establishment period as a Development Application condition of consent on all large scale developments.					
d	Community awareness	1.B.2	Medium	80	UFE
Educate the community about the importance of correctly planting trees and maintaining them during an establishment period.					

Tree Asset Management

The City of Ryde is committed to the ongoing sustainable management of trees in parks and streets within the City.

The City of Ryde recognises that the urban forest is an integral part of the urban form and accordingly its management must be integrated with the management of the entire urban environment including built infrastructure.

The City of Ryde will proactively and consistently manage tree risk management issues.

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
C1	**ASSET MANAGEMENT**				
The City of Ryde will plan and manage its urban forest infrastructure to lessen conflict with and damage to other urban infrastructure and the community.					
a	Urban Forest Audit and Inventory	3.A.1	High	80	DR
Carry out an audit of all trees on public land (street trees and within parks) throughout the City and set up a computerized asset inventory containing this information to inform the planning and management of existing, replacement and new tree plantings. Continuously update the inventory and databases in partnership with Council's Land Information Team. Create databases from the inventory to manage the urban forest as detailed in section 5.1. Include capacity to monitor and record planning of maintenance works and the programming daily work activities. Proactively use the register to guide maintenance, removal, replacement and new tree planting priorities. Regularly update the inventory.					
b	Urban forest canopy survey	3.A.1	High	80	AP / DR
Assess the current level of tree canopy cover by commissioning an aerial photographic survey of the City and undertake a measure of the canopy. Determine the percentage of coverage and use as baseline data to measure a future analysis and determination of canopy enhancement or loss. Repeat the survey every three years.					
c	Service Level Agreements	3.A.1	High	80	DR
In line with the Tree Management Plan proposals, define Service Levels that relate to management and maintenance of the urban forest, following an audit and cost review. Liaise as necessary with field staff when developing Service Levels to ensure optimum practical delivery on the ground and to evaluate implications for field staff skills required, changes to practice and plant/ machinery updates and refinements.					

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
d	Statewide management principles	3.C.1	High	80	DR
Adopt the risk management principles for the consistent management of existing and new street tree plantings as set out in the Statewide Mutual Best Practice Manual – Trees and Tree Root Management, version 2, 2003. Use a risk management approach to inform tree management practices, for example by implementing strategies for putting "the right tree in the right place", providing more space for tree roots through design and planning, or making the space right by modifying site conditions.					
e	Urban Bushland Mapping	3.C.1	High	79, 73	DR
Update the City of Ryde Urban Bushland mapping to gain an up-to-date overview of the extent and type of remnant bushland and other vegetation. Review the mapping every five years.					
f	Remnant vegetation and bush regeneration	3.C.1	Medium	79,73	DR
Register remnant vegetation on the Significant Tree Register. Prepare and implement a maintenance policy for remnant vegetation and bush regeneration on public land.					
g	Integrated management	3.C.1	High	80	DR
Using a "whole tree management system" as a long strategy for reducing or preventing hazards including: • Planting only high quality tree stock supplied in accordance with best practice • Detailed site planning to provide sufficient space and environmental conditions to ensure trees establish quickly, grow, remain healthy and reach mature size; • Arboricultural best practice site preparation and planting techniques; • Regular maintenance throughout the establishment period including water, formative pruning of young and semi-mature trees; and • Ongoing, programmed assessment and maintenance of semi-mature and mature trees. Determine processes to ensure managers and staff from all departments work in an integrated manner to achieve the best practice outcomes for the protection and enhancement of the urban forest.					
h	Managing conflicts	1.C.2	Medium	80	FS
Consider the tree species and mature tree size when planning new planting to avoid conflicts between trees and built structures. Educate staff to carry out root control works and set up a list of approved contractors to carry out these works on the City's behalf.					

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
i	Training and Education	3.C.3	Ongoing	80	UFE
Budget for and allocate funding to train tree management officers and maintenance staff to enable effective tree management to industry best practice standards.					
j	Resource allocation	3.C..	High	80	UFE
Acknowledge that expenditure on trees is a critical part of the risk management process and allocate resources accordingly to a whole tree management system approach. Identify and allocate funding for a whole tree management system approach (as described in section 5.9), for trees on public land including the selection and purchase of high quality tree stock, best practice planting techniques, formative pruning, ensuring sufficient water during establishment and ongoing planned maintenance.					

Tree Removal and Replacement

To sustain the urban forest senescent trees need to be replaced. To successfully manage tree senescence the City of Ryde needs to plan for tree removal and replanting, and manage community expectations and perceptions. Succession planting is important because it will shape the character of the City for future generations.

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
D1	**SUSTAINABLE URBAN FOREST**				
The City of Ryde will plan for a sustainable Urban Forest that maintains and increases canopy cover across the City. **The City of Ryde will preserve the cultural, heritage and ecological importance of trees and places.**					
a	Identification and Management of Senescence	3.C.1	High	80	FS / DR
Set up a computerised asset inventory of all street and park trees to percentage of the tree population within the City that is senescent; Determine the expected longevity of the tree population within the City by using Useful Life Expectancy (ULE) or another arboricultural industry recognised method. Develop and manage databases based on the inventory to prioritise the monitoring, hazard assessment, removal and replacement of existing trees, assist in forecasting tree senescence patterns and to guide succession and new tree planting priorities. Regularly review and update the inventory and databases.					
b	Risk management	3.C.1	High	80	FS / DR
Develop assessment criteria and procedure to ensure a consistent approach to hazard evaluation and tree removals.					
D2	**HABITAT CONSERVATION**				
The City of Ryde recognises and will consider the habitat value of trees on public land prior to removal.					
a	Captial Works	3.C.1	Ongoing	80,81	FS
Ensure the operations/parks maintenance department/grounds staff/internal maintenance practices are carried out and recognise the importance of parks and bushland reserves as areas of conservation for native flora and fauna. Identify parks and areas within which: • shelter sites are improved including ensuring dead trees are only felled where they are considered dangerous to park users and private property; and • away from the edges of bushland reserves, fallen logs and branches are left for ground shelter for native terrestrial fauna.					
b	Community awareness	3.C.1	Ongoing	80, 45	QS / UFE
Promote awareness of and encourage habitat conservation for native fauna.					

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
D3	**COMMUNITY CONSULTATION**				
The City of Ryde will inform and consult with the community about tree removals and replacement planting.					
a	Community awareness	3.C.1	Medium	80,83, 45	QS / UFE
Advise and educate the community about the reasons for tree removal and the replacement planting process.					
b	Notification	3.C.1	Ongoing	80, 83, 45	QS / UFE
Review the procedure for community notification of tree removals and use this procedure in all circumstances except for removals carried out because of natural emergencies or for public safety.					
D4	**REPLACEMENT PLANTING**				
The City of Ryde will incorporate ecologically sustainable design principles and risk management in the selection of species for replacement tree plantings where appropriate. **The City of Ryde will consider cultural, heritage, neighbourhood character and ecological factors when selecting trees in addition to the suitability of tree species to the planting location.** **The City of Ryde will require all trees planted on public land to be good quality tree stock in accordance with current industry best practice.**					
a	Species selection	3.C.1	Medium	80, 81	FS
Investigate the use of environmentally suitable trees in streets and parks throughout the City. Plant locally endemic native trees appropriate to the environmental setting in parks and bushland reserves.					
b	Street Tree Masterplan	3.C.1	Medium	80	FS
Replace street trees with species identified the City in the Street Tree Masterplan.					
c	Stock quality	3.C.1	Ongoing	80, 81	FS
Ensure all tree stock supplied for planting on public land conforms with the AS2303 2015 tree stock for landscape use.					
d	Tree planting	3.C.1	Ongoing	80, 81	FS
Ensure all replacement tree planting carried out by the City complies arboricultural industry best practice and with the provisions of the Tree Management Technical Manual.					
e	Tree establishment	3.C.1	Medium	80	FS
Ensure the budget allocation for tree planting includes resources for maintenance (eg. watering, mulching, formative pruning) during a 104 week establishment period after planting.					
D5	**WEED MANAGEMENT**				
The City of Ryde will pro-actively reduce environmental weeds in public open space.					
a	Species selection	3.C.1	Medium	80, 81	FS
Identify and pro-actively reduce environmental weeds in public open space following consideration of any habitat benefits					

Community consultation and involvement

The City of Ryde has a culturally diverse population. This provides a unique challenge for the City of Ryde in urban planning, the management of trees and open space because of the cultural differences in the perception and attitudes in relation to the role and value of trees, natural areas and parks.

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
E1	**DEVELOPING COMMUNITY AWARENESS**				
The City of Ryde will promote community awareness of the benefits of trees in an urban environment and tree management on both public and private land. **The City of Ryde wants the community to gain an understanding and interest in the trees in their neighbourhood and throughout the City.**					
a	Community Education	3.C.1	Ongoing	80, 45, 168, 168	UFE
Produce information to educate the community about: • The benefits of trees in an urban environment; • Suitable native and exotic trees to plant on their property and how to plant and manage trees • The creation of habitat and being part of vegetation corridors for those residents who live in areas close to and between bushland reserves; • The value of remnant vegetation and bushland; • Their legal responsibility to preserve and protect trees and the consequences of a breach of these responsibilities. Promote the Tree Management Policy, this Plan, the Street Tree Masterplan, the Significant Tree Register, revised DCP 2014 Part 9.5 (Tree Preservation) and the Tree Management Technical Manual.					
b	Access	3.C.1	Ongoing	80	UFE
Make all tree management information easily accessible to the community and provide urban forest management information to the community via City of Ryde publications. Regularly review, up-date and add to the City's Tree Management information and ensure all information is available on the City's website.					

Ref	Topic/Action	Outcome	Priority	Accountability	KPI
E2	**BALANCING COMMUNITY OUTCOMES**				
The City of Ryde will manage the benefits and risks associated with trees in an urban environment in order to achieve the best community outcomes. **The City of Ryde will consult with the community to ensure the community has a means of representation in tree related matters.**					
a	Community awarenesss	3.C.1	High	80	UFE
Promote and publicise the Tree Management Policy, this Plan, the Significant Tree Register and the Street Tree Masterplan.					
b	Community consultation	3.C.1	Ongoing	80	UFE
Ensure the community are well informed about tree removals; and replacement planting.					

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