



Western Sydney Parklands

WESTERN SYDNEY PARKLANDS

Tree Management Plan

May 2023

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Executive Summary and Vision

Western Sydney Parklands Trust recognises that trees are an important part of our natural and cultural landscape. We are committed to promoting and protecting these important assets. This Tree Management Plan is a vital step towards maintaining and managing our trees in a professional, consistent and appropriate way.

The Western Sydney Parklands is over 5,000 hectares of public land managed by the Western Sydney Parklands Trust (the Trust). It stretches 27 kilometres from Quakers Hill in the north to Leppington in the south. The Parklands is characterised by a diversity of land uses from native bushland to world class recreation, entertainment and tourism facilities.

Trees are an important part of Western Sydney Parklands. The trees tell the story of the Parklands, reflecting the changes in land use and changes in cultural practices that have helped shape the landscape of the Cumberland Plains and the tree population in the Parklands. It isn't simply the age, species or size of the trees that makes them important, it is their links to nature, the past, and their relationship with the story of the people and the changing landscapes of western Sydney.

The Trust is mindful that the significant green infrastructure of the Parklands, including the remnant native trees, are some of the most defining and precious elements of this landscape. We must continue to protect, manage and replace our trees in order to pass on the Parklands' legacy for the enjoyment and benefit of present and future generations.

"They are beautiful in their peace, they are wise in their silence. They will stand after we are dust. They teach us, and we tend them."

Galeain ip Altiem









Introduction

1.0 Introduction



1.1 Overview and Purpose of the Tree Management Plan

'Western Sydney Parklands is a place that offers diverse experiences, celebrates its natural qualities and creates an identity for local communities. By respecting the area's heritage and planning for the future, the Parklands will be a sustainable legacy for generations to come.' (WSP PoM 2030)

Covering 5,280 hectares, the Parklands stretch 27km from Quakers Hill in the north to Leppington in the south. While much of the land is still to be developed for its long-term purpose and remains as interim land uses, when complete, the Parklands will be the largest urban Parklands in Australia.

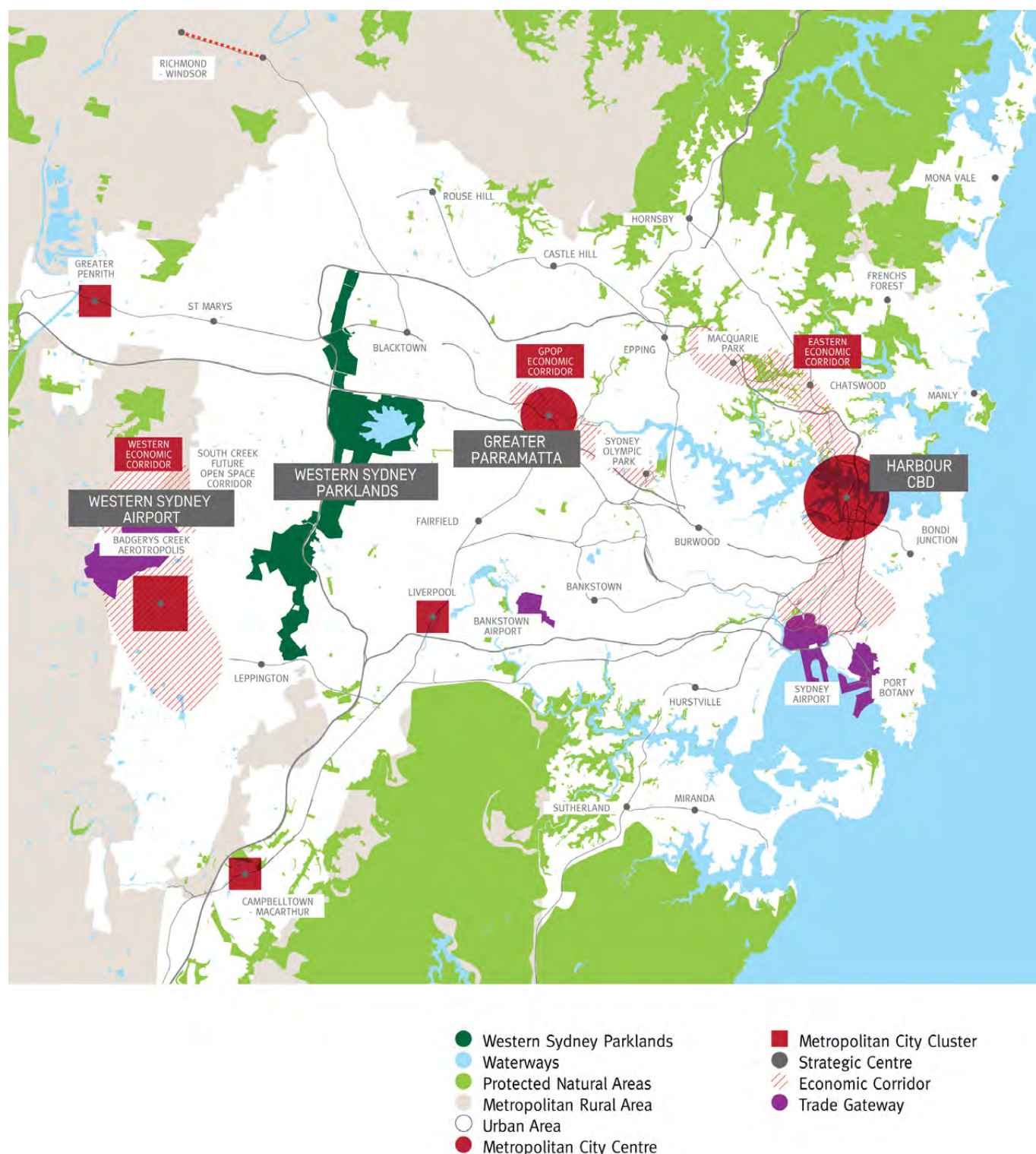


Figure 1.1 - Context map that illustrates the position and size of Western Sydney Parklands and its relationship to the greater Sydney region and key infrastructure and urban centres. (Source WSPT - PoM 2030)



Figure 1.2 - Western Sydney Parklands is a valuable and extensive urban Parklands corridor running through central western Sydney. It is now well graced with trees. The trees are dominated by native species and both young and old.

The design and implementation of facilities throughout the Parklands must respond to this vision and the principles identified below. The Trust aims to ensure the Parklands:

- is enjoyable for people of all ages, cultural groups and backgrounds and enhance community health.
- protects natural environmental values through sustainable management, development and promotion.
- Respects cultural heritage by identifying, protecting and managing Aboriginal and non-Aboriginal cultural heritage including rural and bushland landscapes
- is identifiable as Western Sydney's 'backyard', welcoming and inclusive for all
- is educational and provides information about sustainable Parklands management, heritage, agriculture, recreation and a range of other activities
- is accessible to all - physically, economically, in terms of safety, transport and other factors
- is financially and operationally viable, for the Trust and for those using the land and
- adopts a partnership approach, working together with local government, community stakeholders and the private sector.

The trees of the Parklands provide shade, beauty, screening, enclosure, and definition to the landscape. Without them, the Parklands would be uninviting and uninspiring. We need the trees - without them we would have no Parklands.

Trees are one of the most difficult and complex elements to manage in an urban Parklands environment. They are living and dynamic items that respond to, and interact with their surrounding environment. As they grow they can transform from relatively small trees to very large trees or anything in between. They are impacted by environmental factors such as soils, pest and diseases, drought, waterlogging, wind, heat and cold. They are also extremely numerous. The Parklands contains millions of individual trees, therefore they are

probably the single most numerous asset we must deal with on a day-to-day basis.

They will live, mature and die. They can be long lived or relatively short lived, evergreen or deciduous. They can be of an almost countless variety of different species, each with their own set of requirements and management needs. They can have multiple layers of significance and meaning, and relate to many different periods of the Parklands long history. Trees that were once fashionable and popular can now often be seen as undesirable and problematic. They can provide food, roosting sites and homes for many different kinds of native and introduced fauna, both large and small. This is growing in importance in an ever-increasing density of urban development and diminishing natural areas within our cities.

Trees are also impacted by people using the Parklands. People can often intentionally or accidentally damage trees. Young trees are particularly susceptible and can often be snapped, broken or permanently damaged by Parklands users. Impacts from vehicles can damage tree trunks and lower branches and open the tree to pest and disease attack. Inappropriate parking or vehicle movements around trees can quickly compact soils and lead to damage of their roots and tree decline. Inappropriate maintenance such as improper pruning can also impact the trees, leading to increased risks of failures, inappropriate reductions of all-important foliage and increased risk of pathogen attack or decay. Lack of care and control of horticultural hygiene can also lead to the inadvertent spread or introduction of diseases around the Parklands.

Trees will drop leaves, bark, fruit, flowers and sometimes even branches. Trees offer habitat for birds and animals, that may themselves cause nuisance and unwanted mess. This is an inevitable natural process and part of the trees 'living' and 'growing'. Just because a tree does these things, does

not immediately mean it is a problem or dangerous. We need to accept many of these things in return for the massive environmental, aesthetic, social, heritage and economic benefits they provide.

Trees have above and below ground parts. People see, understand and appreciate the above ground elements but roots are often unseen and unconsidered. Without them, however, the tree cannot survive. Tree roots can, and do, interact with other surrounding trees and infrastructure. They can be very easily damaged resulting in either rapid or gradual decline in health and even potential instability of the tree. In rare instances, whole trees can fail and fall over. This is an infrequent occurrence, and usually associated with extreme weather conditions. Whole tree failures in urban environments are nearly always a result of some kind of historical damage or inherent dysfunction of the tree's root system. Proper planting, and tree protection can help minimise these issues.

In natural environments such as forests and native woodlands, trees can live, die and fail with little or no detrimental impact to humans. This is all part of the natural processes. However, in the more highly visited parts of the Parklands, trees need to be proactively managed. This management needs to be appropriate to the significance of the tree, the size of the tree, the species of the tree and the location of the tree. Trees can pose risk to life and property, but this risk is directly proportional to the location of the tree and the likelihood of anyone or anything being impacted if the tree fails. Tree risks are therefore not equal for all areas of the Parklands. Large trees, in close proximity to heavily used areas and in the declining stages of their life will need far different care, monitoring and management approaches than small trees in the middle of a wooded area, that is seldom visited.



Figure 1.4 - The Parklands contains a diverse mix of trees from remnant endemic vegetation through to young feature specimens such as this Hoop Pine, associated with intensively used Parklands areas like Plough and Harrow.



Figure 1.3 - Trees and the benefits they provide are an important part of the Parklands and provide a welcome respite from the surrounding urban development.



Figure 1.5 - Trees are an important and widespread Parklands asset and need to be appropriately managed for environmental benefit, safety and amenity.

There are entire text books written about tree management. It is unrealistic for this Plan to cover all elements and potential eventualities that surround tree management in a complex urban setting. It is designed to simply and succinctly outline the key principles, activities and requirements of our normally expected tree management and maintenance. It is also designed to provide guidance and education regarding the myriad of activities that are required to maintain these complex and living assets.

If the tree is well planned for, well selected, well planted and established in its early years, it should, in theory, require only minimal ongoing maintenance. Every tree however, will have a lifespan and at some point may need to be removed.

Obviously not every tree within the Parklands had the benefit of excellent planning, selection and planting methods. Therefore, we also need to manage trees that exist within the Parklands that may not be well positioned or the most appropriate species. As mentioned, trees are living things and sometimes factors well outside of our control may also impact upon trees and require intervention.

Why has the Trust prepared this document?

The purpose of this document is to:

- Recognise existing trees of important natural heritage or cultural heritage significance.
- Establish our commitment and future strategic direction for the planting, protection, management and ongoing maintenance of our tree resource.
- Document our normal tree management and maintenance practices.
- Provide a framework for consistent decision making, documentation and standardised processes and policies.



Figure 1.6 - Trees are used, enjoyed and appreciated by people of the Parklands in an almost endless and ever changing variety of ways.

Structure of the document and definition of a tree.

This document is broken into several sections which focus on the most important tree management issues, being:

- The context & history of the Parklands.
- The different types of trees to be managed.
- Protection of existing trees.
- New tree planting & establishment.
- Tree risk management, maintenance & removals.

This document provides the framework for tree management to be applied consistently to the 'typical' operational requirements of the Parklands. The vast majority of situations will be broadly covered, however, should the specific circumstances of a particular tree, design project, capital works project or event not be adequately addressed, it remains the responsibility of the relevant project leader (design, operations or event) to seek adequate clarification before any work is undertaken in the vicinity of any 'tree'.

All trees within the Parklands are important, and need to be considered, as they may contribute directly to the natural, aesthetic or heritage values of the Parklands. The intent of this document, is to specifically address what is considered a 'tree'. A 'tree' for the purposes of this document is typically defined as:

A woody perennial plant greater than 5m tall and with a trunk diameter of at least 100mm when measured at a height of 1.4m above the ground.

Trees and other plants smaller than this shall typically be dealt with under other general landscape or other bushland management provisions.



Figure 1.8 - Many of the significant trees are now large and aging specimens, such as remnant trees with significant and valuable habitat hollows. These large hollows typically only occur in trees that are at least 100-150 years old. Removal of these is now seen as a key threatening process for many endangered fauna species.



Figure 1.7 - The trees are of a wide variety, varying in age and with different relationships to existing infrastructure and Parklands users.

Why is tree management important?

Tree management is a critical component within the overall management of the Parklands:

- To ensure the protection and preservation of our substantial natural and cultural heritage of the Parklands.
- To protect and enhance the Parkland's natural ecosystems.
- To protect and enhance the Parkland's aesthetic appeal.
- To manage tree related risks within the more intensively used public open spaces.



Figure 1.9 - Plan of the Western Sydney Parklands illustrating the extent of the Parklands. (Source: WSPT)

1.2 The Scope of the Tree Management Plan

The scope of this Plan covers the Western Sydney Parklands, and more specifically, the areas that are under the direct management and control of the Western Sydney Parklands Trust. Its focus is primarily on the tree management within the more 'managed' landscaped areas of the Parklands, being areas that are the most heavily patronised by Parklands visitors or attendees of organised events.

It provides documented and standardised processes to ensure consistency in the ongoing protection, management and maintenance of one of the most significant assets within Western Sydney Parklands.

This document is not intended to cover or inform activities such as native bushland regeneration or bushland management. Nor is it intended to directly control tree management practices in areas subject to separate commercial lease or other tenancy arrangements (such as independently run business hubs, tourism, sporting and entertainment venues) or those areas within the Parklands still under private ownership, or under the control of utilities providers, local councils or other statutory bodies.

While tree management in the other areas subject to a lease agreements or other commercial arrangements (as noted above) will primarily be the responsibility of the lessee or other land manager, the principles contained within this document shall still be considered the basic standard and framework for tree management activities in these other areas.

Likewise, any new areas added to the Parklands, or developed as activity hubs in the future will be generally managed in accordance with the policies expressed in this document.

1.3 Framework and Policy Context

The Western Sydney Parklands Trust (the Trust) was established under the Western Sydney Parklands Act 2006.

The role of the Trust is to plan, develop, manage and fund the Parklands in a sustainable and viable manner in partnership with other government landowners, stakeholders and the broader community.

The Trust is required to maintain a balance between achieving environmental and community objectives whilst ensuring that over time it will be financially self-sustaining. In order to achieve this balance, the Trust must continuously assess how the achievement of one objective impacts others and to continuously adapt to changing environments.

Where does this document sit in the context of other plans and policies?

The key legislative and policy framework is outlined in Figure 1.10 and includes:

- Western Sydney Parklands Act 2006 - which sets the boundaries of the Parklands and established the Western Sydney Parklands Trust.
- Western Sydney Parklands Regulation 2013 - which sets a framework under which the Trust manages access to and the undertaking of commercial operations within the Parklands .
- SEPP (Precincts Western Parklands City) 2021 - which provides the statutory planning framework for the development of the Parklands.
- Metropolitan Plan for Sydney 2036 (December 2010) - which outlines the Parklands' role in providing valuable regional open space.

Some other policies include the NSW National Parklands and Wildlife Act 1974 which applies particularly to:

- Kemps Creek Nature Preserve.
- Prospect Nature Reserve.

The key documents prepared by the Trust that have informed and guided this current Tree Management Plan include:

- WSP Plan of Management 2030 (prepared in 2018) - The PoM 2030 provides an overall framework for the operation and development of the Parklands.
- WSP Biodiversity Strategy 2012-2020 - Provides the Trust with a framework for the development and management of environmental assets within the Western Sydney Parklands.
- WSP Design Manual v.2 (2018) - Outlines the general approach to the design and implementation of various Parklands infrastructure throughout the Parklands.

The following outlines the key objectives, statements and recommendations relating to trees from the key framework documents which in turn informs and guides the recommendations made within this Tree Management Plan.

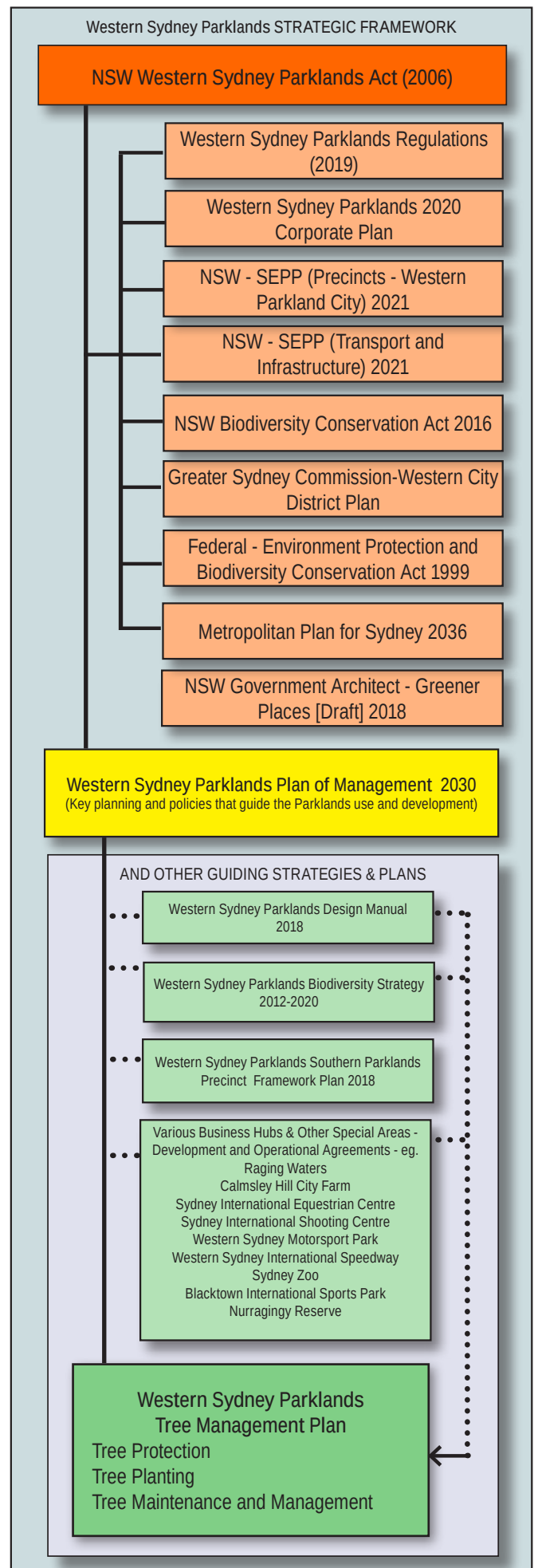


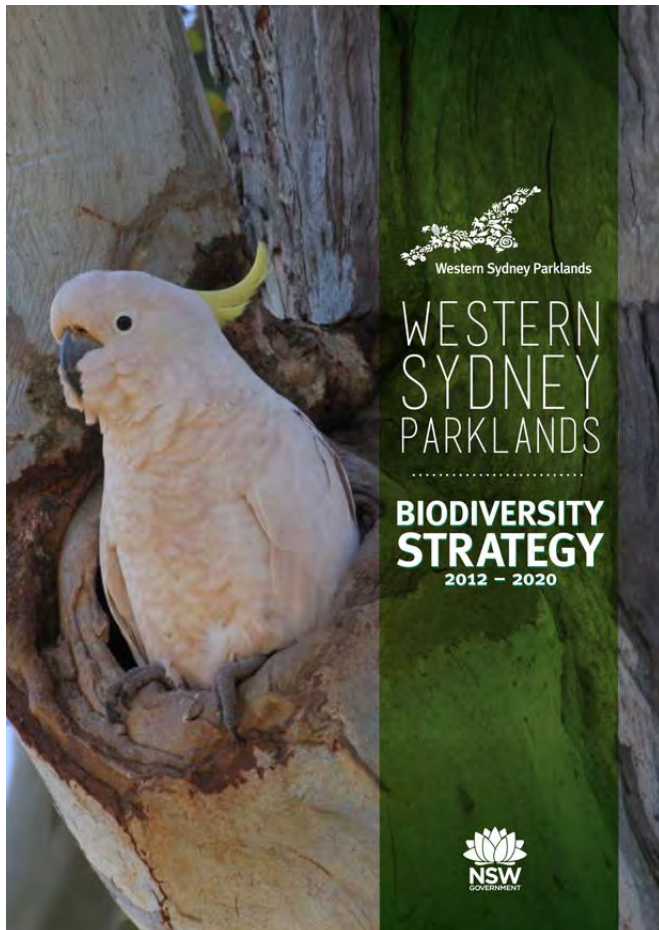
Figure 1.10 - The policy and strategic framework for the Tree Management Plan and its relationship to the Trust's other key policy documents.

Western Sydney Parklands - Plan of Management 2030

Western Sydney Parklands is a significant part of the Sydney Green Grid, which is a web of connected open spaces. It includes regional and local Parklands, wetlands, rivers, creeks, playgrounds, playing fields, cycle ways and pathways; connecting residential areas to centres, public transport, jobs and recreation.

Some of the fundamental principles from the above document that relate to tree management are:

- Environmental protection and land stewardship.
- Expanding existing biodiversity corridors and core habitats that connect the Parklands to the Green Grid across Western Sydney.
- Undertaking environmental management practices that improve understorey and groundcover biodiversity.
- Working with partners to minimise disruption from infrastructure works and maintenance in existing biodiversity areas.
- Maintain a register of the Parklands' natural assets, including an assessment of quality and financial value.



Western Sydney Parklands - Biodiversity Strategy 2012-2020

The key strategic directions of this document are to improve the biodiversity of the Parklands and include:

- Improve bushland structure, diversity and habitat values.
- Focus on priority weed reduction (for example African Olives).



Western Sydney Parklands - Design Manual v.2 (2018)

The Manual is an important document that outlines the character and vision for the Parklands and its relationship to infrastructure planning, design and implementation. It outlines the standardised approach to elements such as furniture, fencing, tracks, bridges, entry features, and signage. It also outlines the principles for shelters and toilets, playspaces, public art and planting.

The design manual acknowledges that the Parklands are an expansive area and its current character is based on the past landuses. In its approach to planting within the Parklands, it recognises that, for most areas, it is not appropriate to provide high maintenance landscapes. The simple planting palette shall typically include:

- bushland trees with shrub and groundcover understorey,
- native trees in pasture and native grassland,
- native trees in maintained exotic grassland,
- selected non-native trees in maintained exotic grassland.

Typically, species are to reflect the natural Cumberland Plain species, other than at key locations within the activity hubs where some non-native species maybe used as features within the landscape. Ideally, tree trunks are not desired within 2 metres of edge of tracks and paths, to maintain sight-lines and safety for users, particularly cyclists.

Buffer planting is to be used within activity hubs and adjacent to track areas to screen major infrastructure or adjoining development that is highly visible. Buffer planting is to generally include trees and groundcovers or grasses of Cumberland Plain species.

Planting within open space areas shall typically be native canopy trees within a native grassland. Groups of native trees will have the important function of:

- delineating spaces and functional areas,
- screening and channelling views,
- providing shade and shelter.

Planting of iconic and larger growing tree species at key locations such as at entries to activity hubs and tracks will be a key supporting strategy to enhance entry identification, way finding, and boundary identification for the Parklands.

The placement of a group of trees (with a minimum cluster of 3) within the landscape composition at entries is desirable (such as a backdrop to entry wall features). The document suggest that species in such situations may include:

- Hoop Pine (*Araucaria cunninghamii*)
- Forest Red Gum (*Eucalyptus tereticornis*)
- Spotted Gum (*Corymbia maculata*)
- Morton Bay Fig Tree (*Ficus macrophylla*)

This list will may be expanded as activity hubs are developed.

Generally tree canopy planting to carparks is to be a mixture of Cumberland Plain species and should provide a visual buffer to any expansive areas of car parking. Tree planting shall typically be provided along the perimeter of asphalt areas and where possible between car spaces and within larger planting islands.

Generally all areas of planting within activity hubs will be mulched.

1.4 Tree Management Objectives

Western Sydney Parklands is an extensive urban Parklands encompassing a variety of settings including:

- largely 'unmanaged' bushland and native bushland 'regeneration' or 'revegetation' areas;
- agricultural and urban farming areas;
- business hubs;
- a wide range of commercial tourism enterprises;
- a wide range of independently managed sporting and recreational enterprises; and
- a variety intensively used active and passive recreation Parklands spaces, some with complex, intertwined layers of natural, Aboriginal and European heritage.

The following tree management objectives have been formulated. These are specifically aimed at the actively used urban Parklands areas of the Parklands. They do not relate to natural bushland or agricultural areas that are more appropriately dealt with under biodiversity and other general landscape maintenance provisions.

The Primary Tree Management objectives outlined by this Plan are to:

1. Proactively and properly protect and maintain the current tree assets.
2. Conserve and enhance the historical, natural and cultural values of the Parklands.
3. Utilise existing remnant, and new trees where appropriate, to enhance the biodiversity and wildlife habitat of the Parklands.
4. Ensure new trees are installed with the proper planning, selection, best-practice planting and establishment methods.
5. Manage and maintain the trees in the intensively used areas of the Parklands so that tree related risks are maintained at an acceptable level.
6. Develop accurate records of the trees within the intensively managed areas of the Parklands to properly inform future management decisions and future planning of tree related resources.
7. Educate and inform all staff, contractors, event organisers and the general community about the value of the tree resource and how it should be enhanced, maintained and protected.
3. Selectively and appropriately remove existing trees that are inappropriately positioned or that are negatively impacting on the natural, cultural, heritage, or scenic qualities of the Parklands.



Figure 1.11 - Tree provide substantial benefits. They provide shade, shelter, habitat, sequester carbon and reduce run off. We need trees - without them we have no Parklands.

Based on these objectives, the 'primary' tree management actions and recommendations are therefore to:

- Protect and appropriately manage the existing trees within the 'managed' Parklands areas.
- Remove or manage existing trees that present unacceptable risks or that negatively impact on the natural or cultural elements or the existing infrastructure.
- Implement a program of ongoing tree monitoring and periodic inspections to ensure a systematic approach to tree risk and maintenance issues via appropriate horticultural interventions aimed at maximising health and longevity of trees and management of tree related risks.
- Undertake and then maintain detailed periodic tree assessments and accurately locate and identify the majority of 'amenity' trees throughout the designated activity hubs such as Lizard Log, The Dairy, Plough and Harrow, Sugar Loaf Ridge, Moonrise Lookout, The Shale Hills, and Bungaribee Park and collate an electronic database to enable a more informed and ongoing analysis of the tree populations within these more intensively managed areas.



Figure 1.12 - Trees provide substantial benefits for the surrounding urban development. They provide shade, shelter, habitat, sequester carbon and reduce run off and reduce the urban heat island effect . We need trees - without them we have no Parklands and the environment of Western Sydney would suffer.



Figure 1.13 - Remnant trees with hollow are vital to the survival of many native species of birds and mammals.

1.5 The Benefits of Trees

Trees are generally considered as valuable by most people and important heritage and natural assets. In short, the trees of the Parklands are a major contributing factor to why people come and use the Parklands.

Trees provide many social, economic and environmental benefits. They provide links to our natural and cultural heritage, beautify, soften and define outdoor 'rooms', provide wildlife habitat, provide shade to our play areas and passive recreation spaces and play a significant role in determining the overall character of the Parklands. Trees are also critical in the maintenance of a healthy urban environment as they intercept and slow runoff, control erosion, produce oxygen, trap airborne pollutants, absorb carbon dioxide and reduce the urban heat island effect.



Figure 1.14 - People come to enjoy Parklands for a number of reasons but the amenity and enjoyment of being in a green environment is one of the major reasons.

1.6 Tree Costs and Liabilities

While trees play a vital role in our Parklands and urban landscapes, it is also recognised that trees of the wrong type, in poor condition or growing in the wrong place, can create problems and risks that may not be considered tolerable. We have certain obligations with respect to the protection of trees, and also responsibilities to manage tree risks and liabilities.

Tree management in Western Sydney Parklands requires a delicate balance between all the various tree related liabilities (financial and otherwise) and the many benefits that trees provide. Our aim is to provide the best possible outcome in terms of the preservation of heritage, environmental stewardship and the provision of safe, accessible and aesthetically pleasing public recreation facilities.

We also need to consider that new trees are very costly to purchase, install and maintain. Tree planting requires careful planning, and implementation to realise the greatest ongoing benefits. Poor planning, planting in the wrong position, poor planting preparation, poor quality nursery stock and inappropriate establishment maintenance can all give rise to substandard trees and result in increased costs due to ongoing maintenance issues or premature tree failure and replacement. All of this can result in wasted time, money and other resources.

Other issues to consider when managing trees or planning new tree planting are listed below.

- Are the species and location appropriate in the environmental and cultural context of the Parklands?
- Are the trees causing, or likely to cause, significant impacts to surrounding infrastructure? Appropriate physical offsets should be provided to minimise likely tree related impacts to buildings, shelters and other assets such as play equipment, lighting, pathways, roads, drainage, signage, fences etc.
- Consider visitor amenity, health and safety. Is the species appropriate to the location? Does it present or contribute to slip, trip, or fall hazards? Does it present known irritant or allergen issues. Does it provide appropriate sight lines for passive surveillance or provide screening that may facilitate or hide antisocial or undesirable behaviour?
- Is the species a recognised weed or invasive species? Is the tree appropriate to the natural or heritage context of the location? Should it be retained or removed for environmental reasons? Heritage context and environmental issues sometimes require a very delicate balance.



Figure 1.15 - Although trees provide many benefits, if ill placed and ill-considered they can cause issues and damage infrastructure. Appropriate planning and ongoing tree maintenance is critical to managing our trees

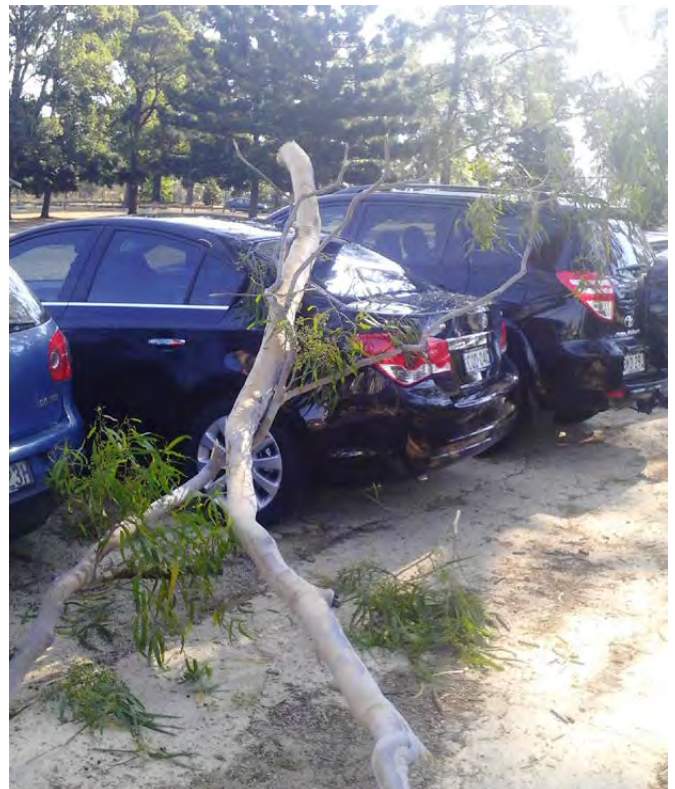


Figure 1.16 - Trees are natural things that can and will occasionally fail. Proper management is always needed to ensure the costs versus the benefits are maintained in appropriate balance. (Photo : WSPT)



Context and History



2.0 Context and History



2.1 The Parklands Location

The Western Sydney Parklands covers an area of land from Quakers Hill in the north to Leppington in the south and when fully developed will form the largest urban Parklands in Australia. The Parklands span the Blacktown, Fairfield and Liverpool local government areas on the expanding urban fringe of Western Sydney.

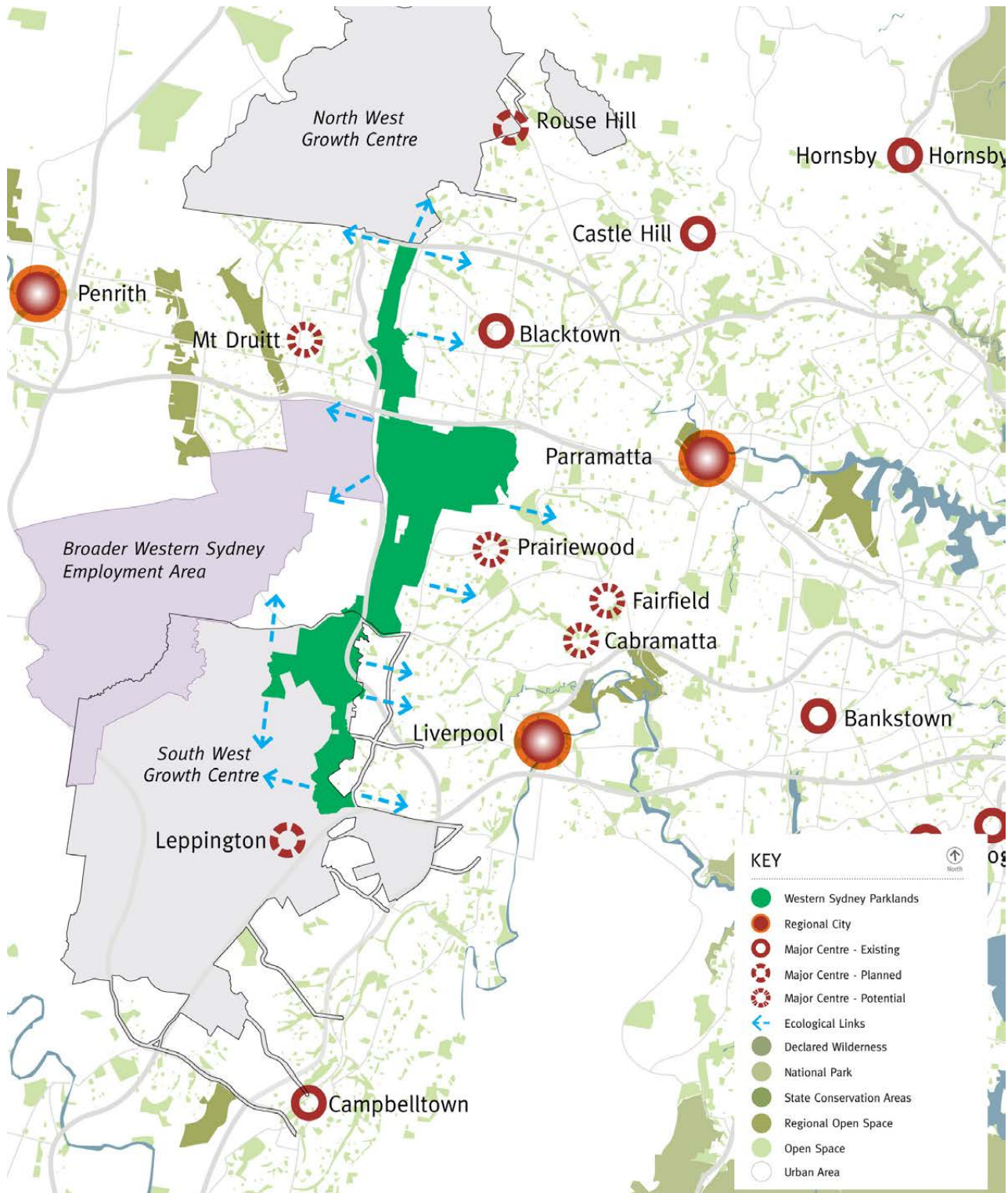


Figure 2.1 - Map of the Western Sydney Parklands illustrating the relationship and context the Parklands have with the nearby areas and potential growth corridors (Source: WPT-Biodiversity Strategy)

2.2 About the Parklands

The Parklands covers 5,280 hectares of open space that are primarily state government owned lands under the management and control of the Western Sydney Parklands Trust.

We see the Parklands as “Sydney’s Biggest Backyard” with annual visitor numbers of approximately 2.6 million in 2016-17 and visitor numbers growing on average by 10% annually. (WSP - POM 2030)

The Western Sydney Parklands Trust was established in 2008 under the Western Sydney Parklands Act 2006. The role of the Trust is to plan, develop, manage and fund the Parklands in a sustainable and viable manner in partnership with other government landowners, stakeholders and the broader community.

The Trust is required to maintain a balance between achieving environmental and community objectives whilst ensuring that over time it will be financially self-sustaining.

As a NSW government agency, the Western Sydney Parklands Trust is governed by legislation enacted by the NSW Parliament. The Parklands is therefore managed in accordance with the Western Sydney Parklands Trust Act and the Western Sydney Parklands Trust Regulations.

2.3 Heritage and Significance

Western Sydney Parklands is a landscape rich in Aboriginal history and heritage significance. Western Sydney Parklands is part of the Country of the inland Dharug people. Dharug territory extended from the Blue Mountains to the coast.

Numerous sites and artefacts, but particularly lithics, or ‘stone tools’, are evidence of Aboriginal people’s presence on the Cumberland Plain over many thousands of years and demonstrate the importance of the nearby quarry at Plumpton Ridge. Stone known as silcrete was extracted here and used throughout the wider region. Concentrations of artefacts can also indicate where important cultural and ceremonial places may have been located. One significant stone artefact scatter has been found at the Rooty Hill.

Oral history tells us that the Cumberland Plain was an important camping and meeting place for Aboriginal people travelling over the Blue Mountains and into Parramatta and Sydney, even after colonial times.

Historical records and the accounts of early British explorers can also provide valuable information. In 1788 Governor Arthur Phillip led an expedition to Prospect Hill. During this journey the party saw evidence of Aboriginal encampments in the form of huts, camp fires, burning trees and kangaroo carcasses.

Important sites both in and near Western Sydney Parklands tell the story of Aboriginal-settler relations in the early colonial period. Prospect Hill was associated with colonial conflict and Aboriginal resistance, but also with an important

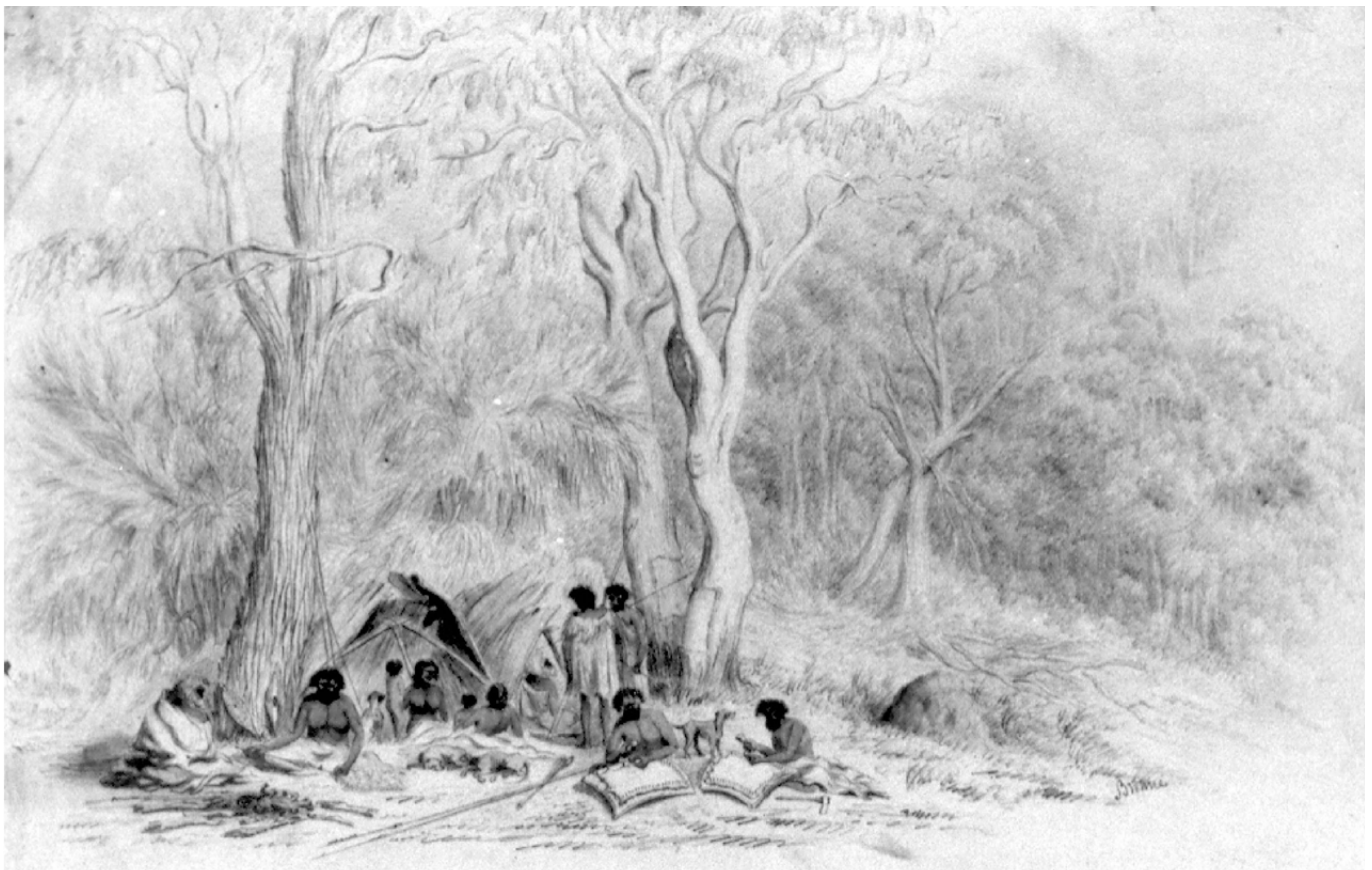


Figure 2.2 - An illustration of an Aboriginal camp in Sydney. (Image Source: Hornsby Shire Library - attributed to T Richard Browne)



Figure 2.3 - Much of the character of the Parklands we see today was generated by the early colonial expansion around Sydney and the use of much of the area for grazing and agriculture. (Image Source: State Library of NSW - Bungarribee Homestead by Joseph Fowles circa 1858)

early act of reconciliation. On 3 May 1805 the Reverend Samuel Marsden facilitated a meeting here between Aboriginal representatives and settlers, and an agreement was reached which brought an end to this particular period of violence.

Colebee was one of two Aboriginal men captured and held at Government House in Sydney in 1789 until he escaped, so he was well known throughout the colony. In 1816, in return for working with colonial government, he and a man named Nurragingy received one of the first-ever land grants to Aboriginal people. Today the symbolism of Aboriginal resilience and their enduring connection to Country is commemorated in Nurragingy Reserve.

Bungarribee Park takes its name from the nearby Bungarribee Estate, which was part of the much larger Rooty Hill Government Farm. The name is thought to mean 'creek with cockatoos' or 'creek with campsite'. Western Sydney Parklands remains an important part of Country for Dharug people to this day and falls within the interests of the Deerubbin and Gandangara Local Aboriginal Land Councils.

There are a number of 'Heritage' sites including The Rooty Hill (Government Farm and Aboriginal transitional camp site between Parramatta and the Blue Mountains), Calmsley Hill City Farm (leased), Prospect Reservoir and the associated canal infrastructure.

In 1802 Governor King established The Rooty Hill as one of the four Government Depots and Stock Farms. It was developed further by Governor Macquarie in 1810 as the second most important of the stock farms in colonial NSW. It provided important reserve food supply for the early colony when it frequently faced crop failures, drought and other difficulties.

More recently, the plan for a Sydney 'Green Belt' can be traced back to the County of Cumberland Planning Scheme, a land use and transport strategy developed in 1948 that proposed a Green Belt around Sydney, connecting the Hawkesbury in the north with the Royal National Parklands in the south via Prospect in the west. Although the Cumberland Plan was only ever partially implemented and ultimately abandoned by the NSW Government in 1977, the principal of the Green Belt, the extensive public Parklands for Western Sydney would ultimately come to fruition, albeit in a different alignment from the original 1948 Cumberland Plan.

The Western Sydney Parklands corridor was first identified in the 1968 Sydney Region Outline Plan. The Parklands was conceived with a single purpose – to provide infrastructure and open space for the current and future communities in Western Sydney.

The acquisition of the land that makes up the Parklands commenced from the 1970s. As of 2015, 94% of the Parklands are under public ownership, although the majority of the lands are yet to be fully developed for their long-term public purpose.

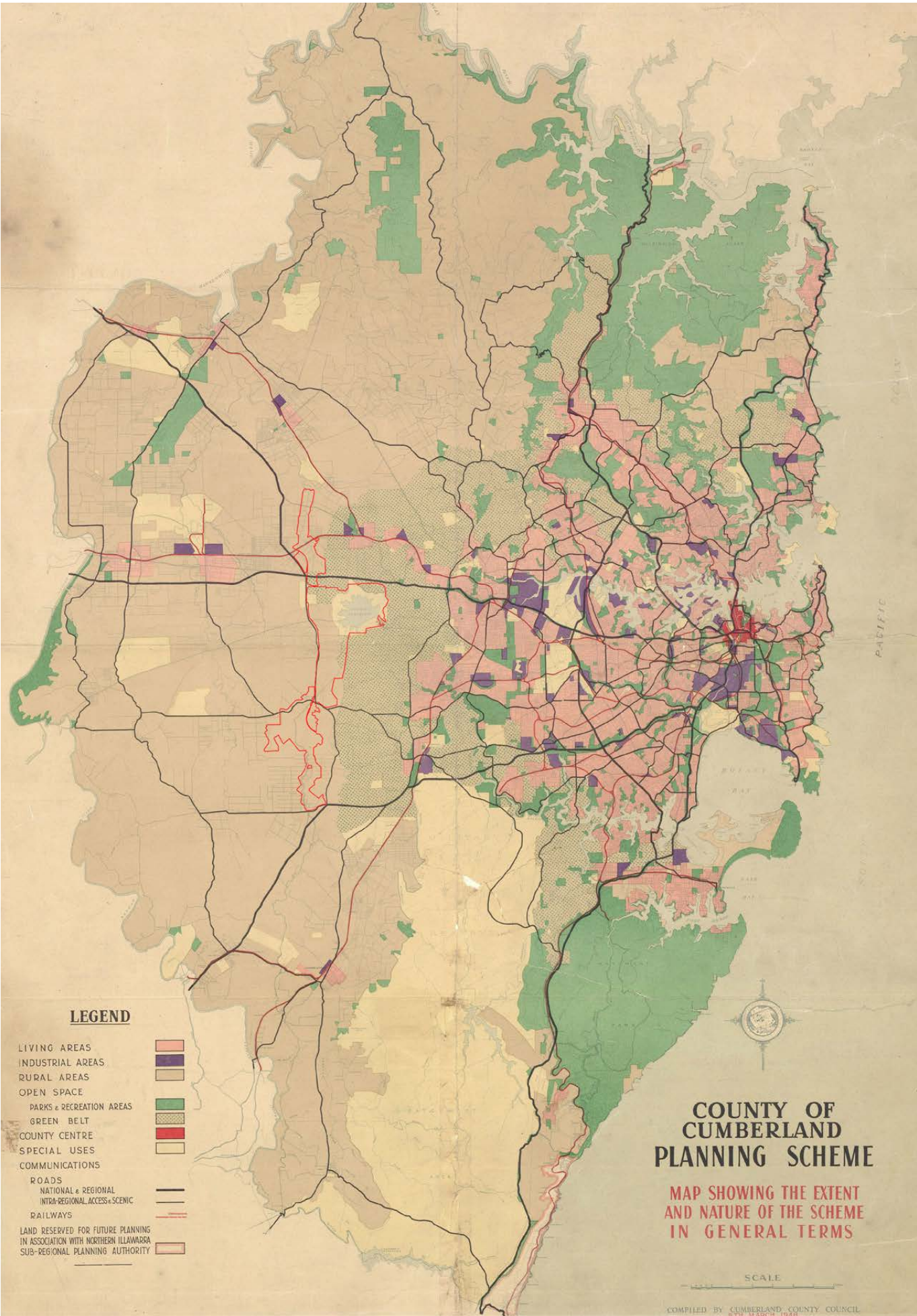


Figure 2.4 - Map of Sydney from the 1951 County of Cumberland Planning Scheme which illustrated a comprehensive 'greenbelt' encircling the greater Sydney metropolitan area. The current location of the western Sydney Parklands is overlaid with this plan showing that some of the intent was realised, but a little smaller and a little further west. (Source: Map accompanying the book - Sydney's Great Experiment by Denis Winston 1957)

Today the Parklands is a living, breathing, self-sustaining organism that stands unique in Australia. At 5,280 hectares, it's Australia's largest urban Parklands and one of the largest in the world.

The following timeline provides an overview of the key dates in the creation of the Parklands:

- 1968 – The Parklands corridor was identified in the Sydney Region Outline Plan
- 1978 – Almost 70% of the current Parklands area was acquired by the NSW State Government.
- 1989 – Key recreation facilities such as the Sydney International Motorsports Park were added via the State Environmental Planning Policy (SEPP) No.29
- 2000 – Parklands corridor provided venues for the Sydney 2000 Olympics equestrian, shooting, baseball, softball and mountain biking events.
- 2001 – Sydney Regional Environment Plan No.31-Regional Parklands, provided a framework to manage land use and development in the Parklands.
- 2004 – Western Sydney Parklands Management Vision mapped out the long-term future for the Parklands
- 2006 – Western Sydney Parklands Act confirmed the Parklands boundaries and the framework to establish the Trust to own, manage and develop the Parklands.
- 2007 – The Parklands track was completed, providing access to the full length of the Parklands.
- 2008 – Western Sydney Parklands Act commenced establishing the Trust to own, manage and develop the Parklands.
- 2009 – SEPP Western Sydney Parklands provided the statutory planning framework for the Parklands development.
- 2011 – The Plan of Management 2020 was published outlining the vision, principles and strategic directions for the management of the Parklands to 2020.
- 2015 – Construction commenced on Stage 1 of Bungarribee Parklands.
- 2016 – Western Sydney Parklands was identified as an integral part of the Green Grid in the Greater Sydney Commission's Draft District Plans.
- 2018 – The Plan of Management 2030 was published, considering the achievements of the past decade and outlining the key priorities and actions for the decade to come. (WSP PoM 2030)

2.4 Parkland Precincts, Character and Uses

There are 16 'management precincts' recognised in the WSP PoM 2030. They are named for their context, geographic location or their historic uses. Their character and typical uses can be broadly categorised as:

- Intensive use, managed Parklands, playgrounds and event spaces
- Low visitation pastures, undeveloped open space and bushland
- Business or tourism hubs, commercial leases and areas under the control of other management entities.

There are also various car park, pedestrian paths and cycleways throughout the wider Parklands where people may interact with trees.

Bungarribee

Bungarribee Park is the largest new recreational space in Western Sydney since the construction of Homebush's Bicentennial Parklands. It offers the Bungarribee Parklands playground, picnic shelters, Warrigal dog run and an extensive bike and pedestrian pathway network.

Abbotsbury

The Abbotsbury area offers three somewhat separate but important and well used open space venues being Plough and Harrow, Lizard Log and The Dairy.

- Plough and Harrow is a popular picnic area surrounded by beautiful native bushland and split into two areas, the east and west. The east is an action-packed area with a playground, cafe, a tree-based high ropes course. The western area is better suited to large groups wanting more open space and shelters for picnics and gatherings.
- Lizard Log is developed as a natural wonderland where interaction with its bushland setting is encouraged via a terrific nature-themed playground, plus BBQ and picnic facilities and scenic walking and cycling tracks.
- The Dairy is one of the Parklands' quieter locations and is ideal for groups looking for a more serene picnic spot or for large outdoor events. Users can simply sit and enjoy the vast district views from the hilltop locations, walk or cycle the Parklands tracks to further explore the area.

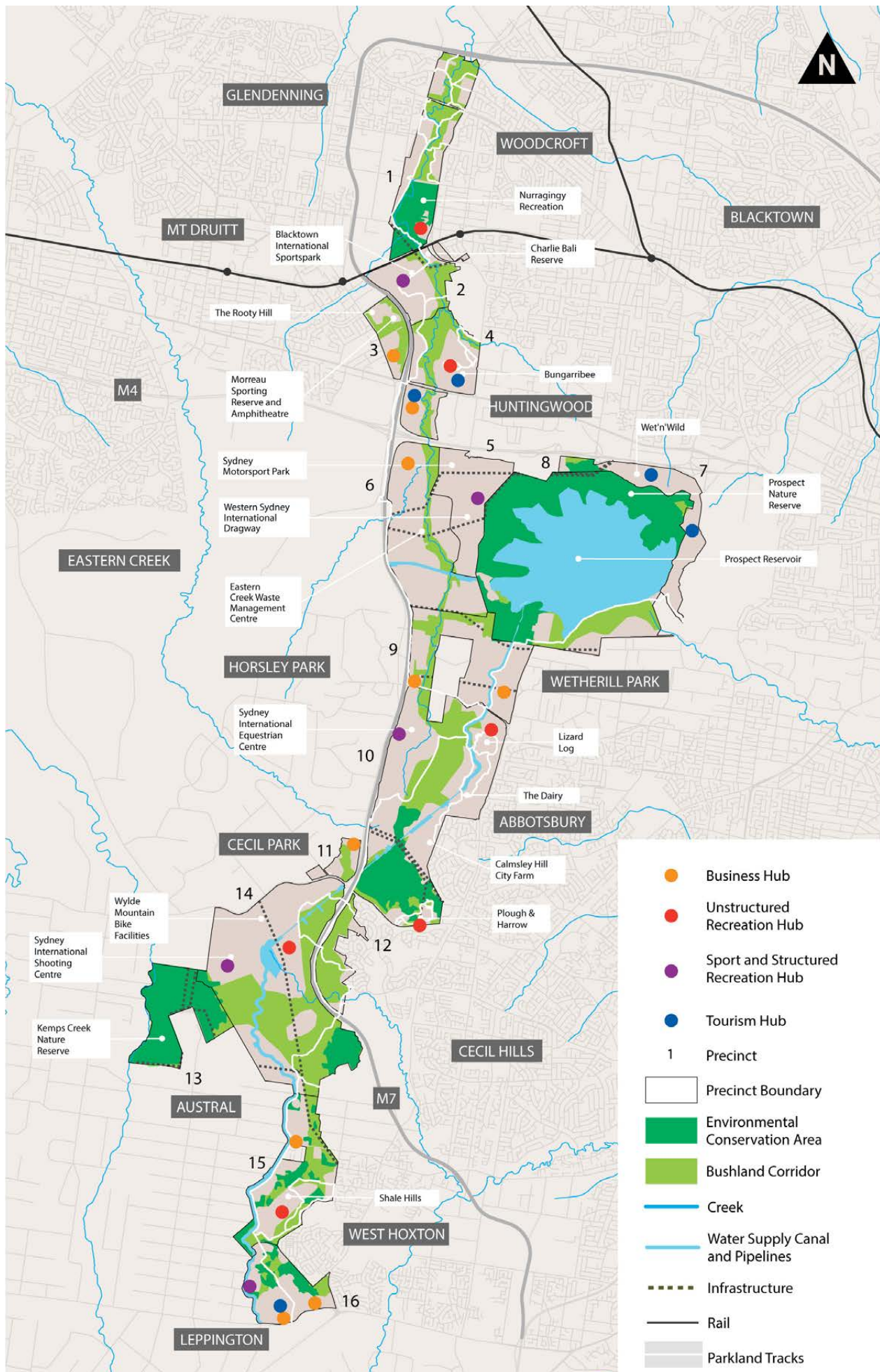


Figure 2.5 - Diagram of the current and principle Parklands zones and key management precincts. (Source : WSPT - Plan of Management 2030)

Nurragingy

This precinct is dominated by Nurragingy Reserve which is a beautiful place for a picnic or more formal events with several designated picnic areas and wood-fired and electric barbecues scattered throughout the bushland and a variety of quiet garden areas. Although within the WSP, Nurragingy Reserve is currently controlled and managed by Blacktown City Council.

Cecil Park

The main offering in Cecil Parklands is the Wylde Mountain Bike Trail.

Other low visitation areas

The majority of the Parklands are what would be described as low visitation areas such as undeveloped pastures and relatively unmanaged bushland. These areas will typically require little if any tree management intervention and will typically be managed if and when required under the Western Sydney Parklands Biodiversity Strategy 2012-2020.

Leased sites or areas under the control of other entities

In the designated business or tourism hubs these are subject to commercial leases and are under the control of other management entities other than the Western Sydney Parklands Trust. Tree management will therefore be the responsibility of the lessee or other responsible management entity.

Parklands use and interaction with trees

As noted in the introduction, this document's focus is primarily on the management of trees in the more intensively used and managed Parklands, playgrounds and event spaces under the direct control of the Trust.

The majority of park users will focus around these main recreational facilities, the main roads and other defined pathways throughout the Parklands. During the week days, most people use the main pedestrian thoroughfares and roadways for exercise from nearby residential areas. Many other areas remain very infrequently visited.

The periods of highest overall park usage are during weekends and public holidays. During inclement weather, the Parklands usage is more moderate.

In the open recreation and general amenity areas away from playgrounds, BBQs and shelters the visitation is typically far more sparse and less frequent. There may be some scattered small groups and picnickers on weekends. In the densely vegetated areas, or unmown natural bushland areas and the steeper portions of the Parklands, visitation is very infrequent and generally discouraged.

Organised events such as community, cultural and sporting events bring with them a much increased level of Parklands patronage and a higher intensity of use within certain areas. This is mainly focussed around;

- The Dairy;
- Bungarabee; or
- Plough and Harrow
- Lizard Log
- Wylde BMX Track and Mountain Bike Trail.

Events, when held, create their own specific set of tree management issues. Large crowds and intensive use of spaces around the existing trees will require specific management plans for the protection of trees and the Parklands visitors alike. This is discussed in greater detail in Section 5.6 - Tree Protection During Events.



Figure 2.6 - People enjoying the wide open spaces and trees at The Dairy

A photograph of a dirt road winding through a forest. The road is in the foreground, leading into the distance. On the left side of the road, there are several tall, dark trees with dense foliage. On the right side, there are lighter-colored trees, possibly eucalyptus, with some bare branches. A red banner with the text "Tree Types" is overlaid on the right side of the image.

Tree Types

3.0 Tree Types

3.1 Overview

Changes in land use, changes in fashion and in cultural practices have all shaped the current landscapes and tree population within the Parklands. Various trees may be reflective of a particular period or influence on the development of the Parklands's landscape.

It must be noted that significant trees, and other trees more broadly, are not restricted to any specific precinct within the Parklands. Trees are widespread throughout the Parklands. The trees transcend and cross over normal precinct boundaries. Tree management is therefore addressed as a function of the tree 'type and its position in respect to its immediate surroundings' rather than by its specific geographic location or precinct. It is more appropriate to consider the management of the trees themselves rather than where they may reside. This deviates from a more 'precinct' based approach which is often applied in other landscape and facilities management.

The trees within the Parklands have been divided into one of seven categories:

1. **Habitat Trees** - Important habitat or large remnant trees.
2. **Trees with Aboriginal Associations** - Trees of potential or known Aboriginal heritage significance.
3. **Primary Area Trees** - Medium to large trees in close proximity to intensive uses and associated facilities.
4. **Entry and Accessway Trees** - Trees close to entries, carparks, roadways, pathways and other trails.
5. **General Amenity Trees** - General park amenity trees.
6. **Environmental Area Trees** - Trees more closely associated with perimeter or visual buffers, riparian corridors, erosion control or native regeneration.
7. **Inappropriate Trees** - Weeds, or very closely spaced trees or other inappropriate trees.



Figure 3.1 - The Parklands contains numerous types of trees from various periods of the Parklands development. They transcend the normal management precincts used for Parklands management and therefore it is more important to focus on the types of trees and their specific needs.



Figure 3.2 - Trees are numerous and varied and will need to be managed throughout their life from early planting through to senescence.

3.2 Habitat Trees

What are they?

These are trees that are pre-European remnants, or the more significant regrowth of the species that are representative of the original Cumberland Plain ecological communities. These typically include species such as *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus amplifolia* (Cabbage Gum), *Eucalyptus moluccana* (Grey Box), *Eucalyptus fibrosa* (Broad-leaf Ironbark), *Eucalyptus crebra* (Narrow-leaf Ironbark), *Angophora floribunda* (Rough-barked Apple), *Angophora subvelutina* (Broad-leaf Apple), and *Melaleuca decora* (White Feather Honey Myrtle).

Where are they?

These trees are scattered throughout all areas of the Parklands and often occur as isolated and visually dominant trees within otherwise cleared active recreation zones and sometimes surrounding sporting fields and other recreational facilities.

Why are they important:

These trees are highly significant for their habitat, ecological, aesthetic and scientific values. Remnant and regrowth native vegetation has a significant association with the pre-European ecology of the area. They provide an important opportunity to understand the assumed vegetation and character prior to European contact. They provide very valuable habitat and food for native fauna and old growth trees of the Cumberland Plain are extremely valued for their rarity due to the extensive land clearing since European occupation. These are also the trees most likely to contain valuable and larger hollows and habitat for important and endangered fauna.



Figure 3.3 - Many trees are significant for other than historical reasons. Hollow bearing trees are an increasing rarity in our urban areas and it is vital that they are retained to provide important habitat for our native fauna.

Primary Management Recommendations:

Most of these trees, by their nature are large and aging specimens. The primary tree management objectives for these trees will be to:-

- Retain and protect them under a program of regular periodic monitoring with a view to maintaining public safety and maximising the individual trees longevity. Where necessary the Trust will establish exclusion zones or implement other methods to maintain tree related risks at appropriate levels.
- Where these trees contain large hollows and other serious defects and begin to noticeably decline in health, the trees should be retained as live stags with selective pruning undertaken to reduce risks from whole tree or branch failure, while maintaining the hollows and habitat as much as practicable.
- Where these trees can be, they should be included within, or on the edge of, areas of new native planting of similar species to maintain the biodiversity and natural legacy and connections with vegetation that pre-existed the Parklands. It is worth noting that much of the more recent and rather extensive tree planting conducted throughout the Parklands over the last few decades is primarily trees native to the Cumberland Plain Woodland, which has greatly assisted in restoring the original character and habitat values of the Parklands.



Figure 3.4 - As habitat trees decline, it may be necessary to create live and dead stag trees to try and maintain their habitat value for as long as possible

3.3 Trees with Aboriginal Associations

What are they?

There are a number of areas within the Parklands that are recorded as significant Aboriginal places that are often likely to contain trees. These sites are identified in the Aboriginal Heritage Information Management System (AHIMS). Only certain nominated people within the Trust can access this information, in order to protect the location, and often sensitive information, surrounding these sites.

It is important when doing any work in areas, or to trees, that may relate to these sites that the personnel managing that work make 'due diligence' enquiries to ensure they will not adversely impact on these culturally important areas. When working in these areas it will be important to follow the methods that are required by the Office of Environment & Heritage's (OEH) Due Diligence Code of Practice for the Protection of Aboriginal Objects (2010).

Some of the areas mentioned above include trees identified as Aboriginal Scar Trees. These are trees which show signs of historic wounding from the mechanical cutting and stripping of bark possibly used by local Aboriginals to make weapons, shields, tools, canoes or other cultural implements.

Where are they?

These trees are scattered throughout the Parklands. Most however, are not associated or within the activity hubs.

These significant Aboriginal places are typically not identified in order to protect the details of their location and meaning, and prevent unwanted vandalism or attention. The trees associated with some of these area may have been assessed to be remnants of the native Eucalypt species that are

also reflective of the original Cumberland Plain vegetation communities that once graced the site. Some of these trees may also be significant because they are large remnant and native habitat trees.

Why are they important?

Scar trees and similar cultural trees are significant cultural heritage items that reflect the cultural relationship between the local Aboriginal people and all things associated with the land.

Primary Management Actions

Most of these trees, by their very nature are large, and aging specimens. The primary tree management objectives for these trees will be to:-

- Retain and protect them under a program of regular periodic monitoring with a view to maintaining public safety and maximising the individual trees longevity. Establish exclusion zones or other methods to maintain tree related risks at appropriate levels in preference to their removal.
- Maintain confidential records of the trees and their location and their Aboriginal significance (via the AHIMS) and to facilitate the future interpretation and study of their original significance, if and when they need to be impacted upon or removed.
- Appropriately store and maintain high resolution digital images of the trees and their scarring and maintain any other relevant documents that may be prepared relating to these trees for future interpretation and study.



Figure 3.5 - Although not prevalent within the activity hubs of the Parklands, there may be occasional trees that have significance to aboriginal culture. This may be because they relate to a significant cultural site or they may be remnant 'scar trees' where bark was potentially removed for shields and other practices (Image Source: National Library of Australia - Joseph Lycett circa 1828 - Aboriginals hunting kangaroo with fire)

3.4 Primary Area Trees

What are they?

These are existing medium to large trees (and young trees with the potential to be medium or large trees) that may occur or been intentionally be planted around and amongst key recreational facilities. These are typically standalone or small clusters of trees. They may also be designed as row, avenue and copse planting which have slightly different management issues and considerations.

Where are they?

These are typically individual significant, or potentially significant, trees that are scattered throughout the Parklands. The trees tend to be clustered around the places within the Parklands that have the highest user interaction. Most concern and emphasis should be placed on the larger trees close to BBQ facilities, shade and picnic shelters, playgrounds and amenities buildings.

They typically include the native trees listed in habitat and remnant trees and may also include trees such as *Ficus macrophylla* (Moreton Bay Fig), *Araucaria cunninghamii* (Hoop Pines), *Araucaria bidwillii* (Bunya Pines) or *Ficus rubiginosa* (Port Jackson Fig).



Figure 3.7 - Trees that will one day provide amenity and shade to well used areas at Plough and Harrow activity hub.

Why are they important?

These trees are already significant, or will be significant in the future, for their amenity value, contribution to the overall design intent of the activity hubs, their European cultural heritage and in most cases simply for their aesthetic values.

Primary Management Recommendations:

Most of these trees are large, or potentially large specimens. They contribute significantly to the development history, unique character and visual amenity of the Parklands. The primary tree management objectives for these trees is to:-

- Retain and protect these trees for as long as reasonably and practically possible.
- Formatively prune and maintain the trees to ensure adequate pedestrian and infrastructure clearances and regularly inspect and prune deadwood.
- Ensure surrounds of the trees are appropriately managed and maintained such as maintaining mulch rings around any trees within grass to maintain root health and limit soil compaction, and mower and other potential damage.
- Implement a regular periodic monitoring program with a view to ensuring public safety while maximising their health and longevity. Where safety becomes a concern, efforts to retain the tree through selective pruning, or the establishment of suitable exclusions zones should be considered ahead of removal.
- Where relevant, seek expert (AQF5 arborist) aboriginal advice to guide and help retain the trees for as long as practicable or improve the health of trees that appear stressed.
- Any future tree planting should not adversely impact the passive surveillance of open spaces, shelters, play equipment, playspaces or important amenities.
- Monitor and remove any self-sown seedlings that may be negatively impacting on the forms or appreciation of the more significant trees or occurring too close to infrastructure.



Figure 3.6 - In areas such as Lizard Log, The Dairy, Plough and Harrow and above in Bungarabee, many of the trees have only recently been planted. Where well chosen and well planted, the ongoing management of these trees should be minimal. However, due to their proximity to actively used areas, they should be regularly reviewed and monitored to ensure they are growing adequately and any acceptable risks are identified and managed.



Figure 3.8 - Trees that have been planted close to the well used facilities at Lizard Log activity hub.



Figure 3.9 - Trees are a critical part of any urban Parklands. He one can see a variety of trees, both native and exotic, that already provide much needed amenity and shade to the well used children's play space at Plough and Harrow activity hub.

3.5 Entry and Accessway Trees

What are they?

There is a variety of feature trees and row, avenue or copse plantings that line carriageways and roads, and define key entry points into the Parklands. These are important visual cues and important way finding elements for the community. There is also an extensive system of pathways and trails that allow vehicular, pedestrian and bicycle circulation around the Parklands. There are numerous existing trees adjacent these accessways together with trees that have been more recently planted to define and shade the pathways and roads.

For the purposes of this Plan, a row, avenue or copse planting is an intentional planting of a number of trees, either in a single or mixed species arrangement with the specific intention of defining or enclosing a space or carriageway. Their significance lies in the intention to use multiple trees for definition and effect and this is intrinsically tied to them being in an intentional arrangement. In these instances it is the assemblage of trees and their relationship to key views and accessways rather than the individual specimens which is important. Individual trees may be removed or replaced without adversely affecting the group as a whole.

Where are they?

These are trees that typically may be defined as being within 10 metres of a defined and recognised pathways, trail, driveway or road. They may also be trees specifically located and arranged to backdrop or frame an entry or view.

Why are they important?

The planting of intentional avenues, rows and copses can provide structure, a sense of place. These may sometimes be formal with relatively few species or much less structured and mixed planting that line a trail. These trees can be important in making trails and walkways much more useable and pleasant by providing shade and screening unwanted views. For roadways and entries they shade pavements, calm and guide traffic and prevent vehicles from entering unwanted areas.

Trees along these area, however, can also pose issues when they get too close to accessways by creating a safety or collision hazard, screening sight-lines between vehicles, cyclists and pedestrians. They may also screen views to important signs or create areas that are perceived as unsafe due to a lack of surveillance.



Figure 3.11 - A key feature of the Parklands is the extensive track and trail network. Trees are vital in providing shade and amenity to Parklands users



Figure 3.10 - A key feature of the Parklands is the extensive track and trail network. Trees are vital in providing shade and amenity to users but the Trust also needs to balance the need for clearances and safety. Self sown trees that occur too close to path edges need to be managed and sometimes removed.

Primary Management Recommendations

The primary tree management objectives for these trees will be to:-

- For key feature trees, planted for formal effect or to reinforce entry statements, place extra importance around their retention and protection for as long as reasonably possible. The integrity of the group planting depends on the stewardship and protection of the group as a whole.
- All new tree planting should be at least 2 metres away from path or roadway edges. Placement should not unduly impact the passive surveillance of adjoining open spaces, vehicular sight-lines, signage or other important amenities.
- For large trees that pre-existed the accessway and are within 2 metres of the accessway edge, implement a regular periodic monitoring program with a view to ensuring public safety while maximising tree health and longevity. Where safety is a concern, or a tree is deemed too close to a road or pathway edge, efforts to retain the individual trees through path realignment, selective pruning, or the establishment of suitable barrier fencing, shrub planting or warning signage should be considered ahead of tree removal.
- Monitor and remove less significant trees or self-sown regrowth that may negatively impact more significant trees or the interpretation of an intentional row, avenue or copse. Some self sown species can be quite fast growing and prolific and early intervention is recommended to protect trees from being overgrown or creating a safety issue close to accessways.
- For any significant avenues or feature trees prepare, when they approach the end of their useful life, a simple succession plan that is typically focussed around like-for-like replacement in very close proximity to the trees they are replacing. If the species is no longer desirable from another perspective (eg. invasiveness, pest and disease attack) then a species that is similar in character and form should be chosen.
- In most instances it will not be appropriate to plant a replacement while the existing tree remains as it will be more appropriate to plant the tree in close proximity to the original tree. For an avenue or row, the replacement strategy needs to consider more complicated factors than replacing one individual tree. It may be necessary to consider one of the following strategies, depending on the location, size of the group and proximity of other trees and infrastructure. For example the type of replacement strategy may include:
 - o block replacement where groups of trees are removed and replaced at one time to perpetuate the avenue
 - o individual replacement of trees as they reach the end of their useful life while maintaining the rest of the group,
 - o staggered replacement where a patterned replacement is undertaken. For example this may include every second tree is removed and replaced and only once they start to become established may the remaining intermediate trees be removed.
 - o offset replacement where a second set of trees is planted at some distance away from the original trees and once these become established the original trees are removed.
- Important entry, row, avenue and significant copses of trees should be clearly and periodically photographed to maintain a record of the trees health and condition and facilitate research and dating of events for future Parklands managers prior to any proposed removals.
- When planning new tracks and key destination points within the Parklands a shade study should also be undertaken to analyse if additional trees should be planted to provide improved and future cooling around pathways and gathering points.



Figure 3.12 - Trees that are low branching and planted too close to roads and car parks can present a safety issue, particularly when near pedestrian crossings. These trees need to be appropriately managed to maintain adequate sight-lines between pedestrians vehicles and to signage.

3.6 General Parklands Amenity Trees

What are they?

These are trees that are typically native trees, but sometimes may be exotic trees. They are typically desirable species that are intentionally planted or otherwise occur throughout the Parklands. They are typically small trees planted close to facilities or they may be any size trees that are located well away from intensively used facilities. Importantly these trees usually provide much needed shade and visual amenity.

Where are they?

These trees are scattered throughout the Parklands, mainly bordering or within larger informal grassed recreation areas or sporting fields, and provide important definition and valuable shade to most of the passive recreation areas. Most have been intentionally planted over the recent decades as part of intensive Parklands improvement campaigns or existing trees that have been retained.

Primary Management Recommendations

These trees represent a large variety of species, sizes and ages. The primary tree management objectives for these trees will be to:-

- Retain and protect them under a program of regular periodic monitoring with a view to maintaining public safety and maximising the individual trees longevity, although they may require less regular inspection than the preceding categories of trees.
- Where the trees are structurally flawed or damaged or begin to significantly decline they should be appropriately pruned, or removed and replaced with specimens of similar character and suited to the particular position or use that is most applicable (eg, screening, shade, amenity, habitat).
- Future tree planting should not adversely impact the passive surveillance of open spaces, shelters, play equipment, playspaces or important amenities.
- Where these trees may be impacting on a more important heritage aspect of the Parklands such as critical view or vistas or affecting the form, habit or appreciation more significant trees or avenues they should be removed or suitably pruned to maintain the vistas.



Figure 3.13 - The majority of trees throughout the Parklands activity hubs are well away from paths and facilities. They are still important from a shade and amenity view point and provide valuable habitat to native fauna but will generally require less detailed scrutiny and management than other more significant trees.

3.7 Environmental Area Trees

What are they?

These may be larger existing trees within areas not frequented by the public. They may also be closely planted trees or trees allowed to regenerate and grow to primarily achieve environmental aims or provide visual buffers, rehabilitation and re-establishment of more naturalistic systems. These trees, are often associated with understorey planting. These are trees that are retained or implemented to enhance environmental management, weed suppression, riparian corridor enhancement and erosion control. Typically they are not intended to be areas of high visitor use or occupancy.

Where are they?

This is vegetation where the lines may be blurred between amenity areas and more natural vegetation or bushland regeneration. This may be riparian revegetation along the banks and channels of more notable creeks, streams that traverse through activity hubs. Along waterways and steeper areas these trees often provide valuable erosion control.

Why are they important?

These trees are important in the process of environmental rehabilitation. They serve a variety of purposes including erosion control, habitat reinstatement, increasing biodiversity and improving water quality. They also may contribute to protection or enhancement of significant views.

Primary Management Activities

These trees are typically in areas bordering amenity areas but are principally intended for environmental rehabilitation and therefore not subject to intensive landscape management other than weed control and possibly selective pruning or management of some understorey regrowth to maintain required sight lines and trail clearances. The Primary management activities will include:

- General tree and vegetation protection including allowing other native vegetation regeneration.
- Removal of weeds and other inappropriate trees that may occur or are self sown within these areas.
- Selective thinning of understorey and selected mature trees to assist with succession of the desired ecological community.
- Selective thinning of understorey to remove inappropriate regrowth and maintain sight lines for visitor safety, Parklands security and to limit the opportunities for concealing possible antisocial activities (such as illicit drug use or vagrancy).
- Selective deadwooding, if required, and pruning for stag and other habitat feature creation where warranted and if the tree is within 20m of a path or well used facility.



Figure 3.14 - Most natural areas and bushland tree are more suitably assessed and managed under the Trusts biodiversity and regeneration guidelines. There are instances around some of the activity hubs where there is a merging of these management needs. Trees that are primarily for environmental and bushland regeneration may be managed slightly different from trees that are designed to provide amenity functions.

3.8 Weeds and Other Inappropriate Trees

What are they?

These are most typically self-sown weeds or other invasive species that may have once been intentionally planted in the past but are now considered undesirable or inappropriate to a public Parklands or along creeks and watercourses.

These typically include, for example Willows (*Salix* spp), Camphor Laurel (*Cinnamomum camphora*), African Olives (*Olea europea ssp africana*), White Poplar (*Populus alba*), Privet (*Ligustrum* spp) and Silky Oak (*Grevillea robusta*).

Some others may be relatively inoffensive trees that have been inadvertently planted in the wrong locations or self-sown and are now growing in locations considered inappropriate due to their impacts on important infrastructure, other more significant or important trees, or desirable views and vistas.

Where are they?

Weeds and invasive species are found through out the Parklands, often growing along creek banks, and in native vegetation regeneration areas and in more limited numbers as scattered trees throughout the various Parkland landscape.

Primary Management Recommendations

Self-sown weeds or invasive species should be systematically and continuously removed unless historically relevant to a particular location.

A systematic approach will be adopted by the Trust for all general ongoing weed removal; particularly targeting trees while they are still young and small, and while they are relatively inexpensive and easy to remove. Larger trees may only be removed when funds and other relevant circumstances allow.



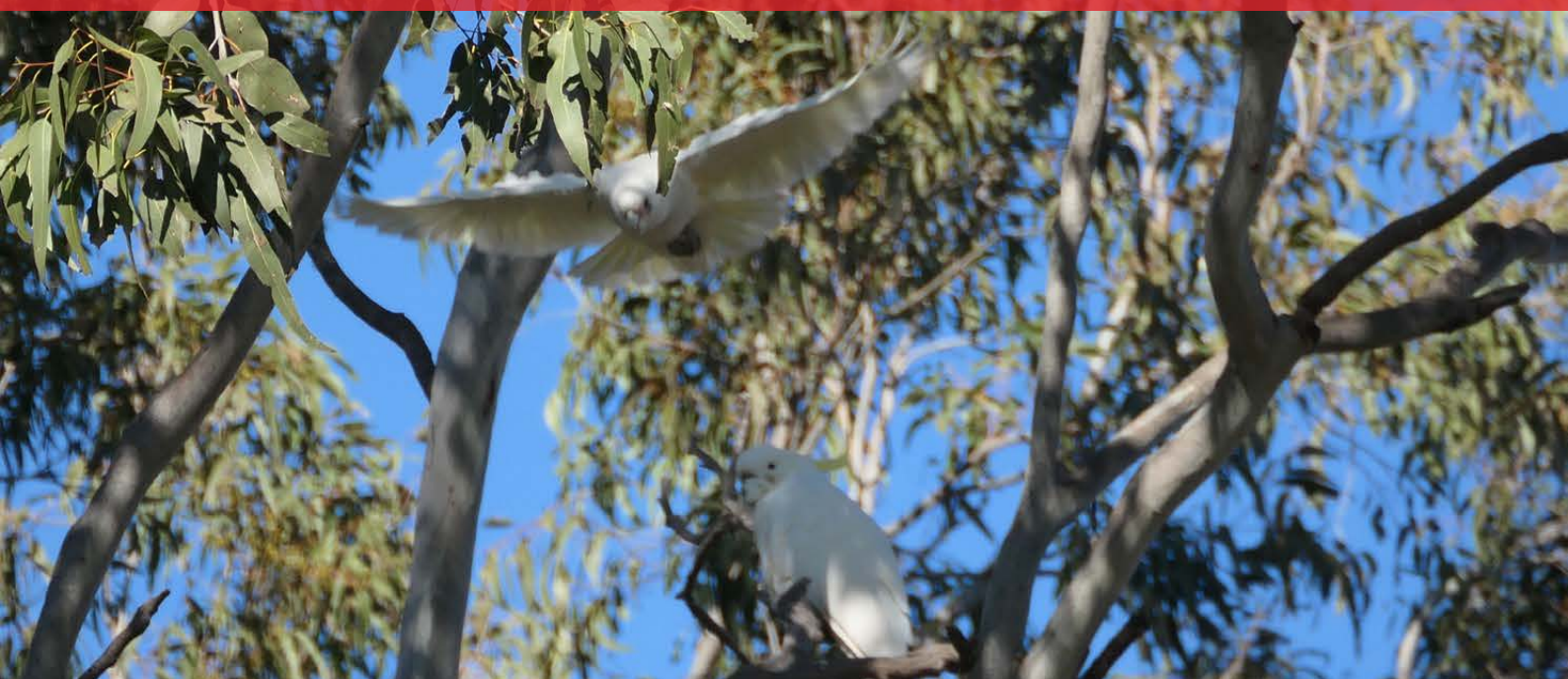
Figure 3.16 - Self sown trees that occur too close to path edges, signage, and other structures need to managed and sometimes removed before they create significant issues.



Figure 3.15 - Weeds and other undesirable self sown trees that occur too close to path edges, or around the activity hubs, will typically be removed and ideally replaced with endemic tree planting.



Implementation



4.0 Proposed Tree Management Implementation



4.1 Tree Management Implementation Overview

The activity hubs within the Parklands are currently well graced with trees. There is certainly scope for additional and future tree planting, particularly around Bungarribee, the Shale Hills and the southern portions of the Parklands, but this needs to be targeted and designed to achieve specific landscape design and recreational objectives.

Tree planting within the Parklands has increased dramatically throughout the last few decades. Many of these trees are still relatively young and, when mature, the Parklands is likely to be well treed with attractive enclosed and tree-lined vistas. The current tree population needs to be managed and protected and allowed to mature to its full potential. There will always be the need for careful and considered succession planting and replacement of failed or inappropriate trees.

It is important to also recognise the importance of defined tree-free open spaces within the Parklands and the protection and retention of views and vistas into and out of the Parklands. There is always a risk that ill-considered planting of trees randomly throughout the activity hubs may actually detract from their recreational use and amenity values.

4.2 Potential Major Tree Planting Programs

Some targeted tree planting, as well as some targeted removals, will always be required and are part of a normal and considered tree management process. New planting is envisaged in the foreseeable future to reinstate or reinforce significant natural vegetation, to provide screening from external influences, and to develop and upgrade areas of the Parklands such as the Southern Parklands Precinct.

Some of the major and potential tree planting programs to be undertaken over the next decade include:

- Mirror Dam
- Shale Hills and the Southern Precinct
- Bungarribee Parklands



Figure 4.1 - Significant tree planting is proposed for the southern areas of the Parklands as part of the Shales Hills improvement. (Source: Arterra Interactive/ WSPT)

4.3 Recommended Tree Removals

Some targeted tree removals will always be required, and are part of a normal and considered tree management process. Removal of trees is not undertaken lightly. It will typically only be done when a tree is dead, damaged, presents an unacceptable risk or is directly impacting on infrastructure or heritage element.

The following removals, have been identified as likely actions to be undertaken in the shorter term.

- Selective removal and thinning of trees within the Lizard Log play and picnic area where they are overcrowded and suppressed. Emphasis should be on removing obviously suppressed specimens and structurally defective or malformed trees ahead of more the vigorous, emergent or otherwise healthy trees.
- Selective removal of some self sown native species close to key playgrounds or other facilities where there continued growth may lead to loss of views for surveillance, impacts to use of paths and equipment or other safety issues.
- Selective removal of various self sown invasive species such as African Olives, Jacaranda, Silky Oaks and other potentially invasive species within the Parklands generally, but particularly near any identified native regeneration and bushland asset areas.
- Selective removal, or crown raising, of some recent native trees and regrowth, in close proximity to trails and accessways.



Figure 4.2 - In some amenity areas, prolific seeding and regrowth of native species can detract from the use, enjoyment and safety of the area. When considered appropriate the Trust may thin-out and selectively remove self sown specimens to ensure designated pathways are kept clear and sight-lines are maintained to key areas.



Figure 4.3 - In some amenity areas, tree size and placement has not always been well considered. Trees that have not been given sufficient room to grow, are too close to pathways or structures or are restricting pedestrian movement and sight lines need to be removed and replaced with more appropriately positioned trees.



Figure 4.4 - Trees that are declining and presenting unacceptable risks will always need to be removed.



Figure 4.5 - Although dense planting can have its place and promote forest style growth, excessive over crowding of trees can have a detrimental affect on the long term health and structure of the trees. It may also lead to excessive competition for limited resources. In amenity areas, such as Lizard Log shown above, the Trust may periodically thin-out and selectively remove some specimens to ensure designated pathways are kept clear and sight-lines are maintained to key areas and that appropriate, resilient and well-formed mature trees are nurtured.

4.4 Succession Planning

Succession planning is only required for the most significant trees and any historic row, avenue or copse plantings. Succession planning should only commence when there is evidence the relevant trees are showing signs of serious decline or ill-health. If this process is commenced too early there is danger of the planning being lost, ignored or becoming irrelevant with passing years and managerial changes.

For most situations a suitable 'Succession Plan' should be a simple 2-3 page document that addresses the following points:

- Clearly identify the specific tree(s) to be replaced.
 - Describe their location and provides a map, survey or diagram accurately depicting their location and in the case of a row, avenue or copse, their quantity.
 - Provide a brief overview of the known significance of the tree(s) (ie. environmental, cultural heritage, scientific, aesthetic, habitat value etc).
 - Consideration given to the significant heritage views and curtilages and potential impacts to Aboriginal significant sites. (Refer to staff capable of accessing the AHIMS).
 - Describe the proposed replacement planting strategy (removal and replacement in the same location, replacements grown adjacent to the existing tree(s) while awaiting for the ultimate removal of the existing tree, block replacement, staggered, offset replacement etc.)
- Provide a methodology for the sourcing, timing and preparation of replacement tree stock with a minimum of:
 - o The anticipated timeline for the replacement project.
 - o The method of propagation (cuttings, seeds, other).
 - o Who will undertake the propagation and of how many (need to allow for failures and further replacements if necessary).
 - o Where the stock will be propagated and grown (what nursery and for how long).
 - o At what size will they be transported and planted, particularly if its likely to need archeological assessments.

4.5 Proposed Operational Actions and Priorities

Formulation of the Tree Management Plan, has highlighted the need for the Trust to undertake ongoing and key tree management activities. Undertaking these activities will be an important facet in achieving the objectives and aims outlined in this document. These are typically detailed and operational issues and subject to periodic update and amendments. For this reason they are not specifically outlined as part of this broader policy document.

The Trust intends to address the following operational items over the coming years so that it can better understand and manage its substantial tree resource.

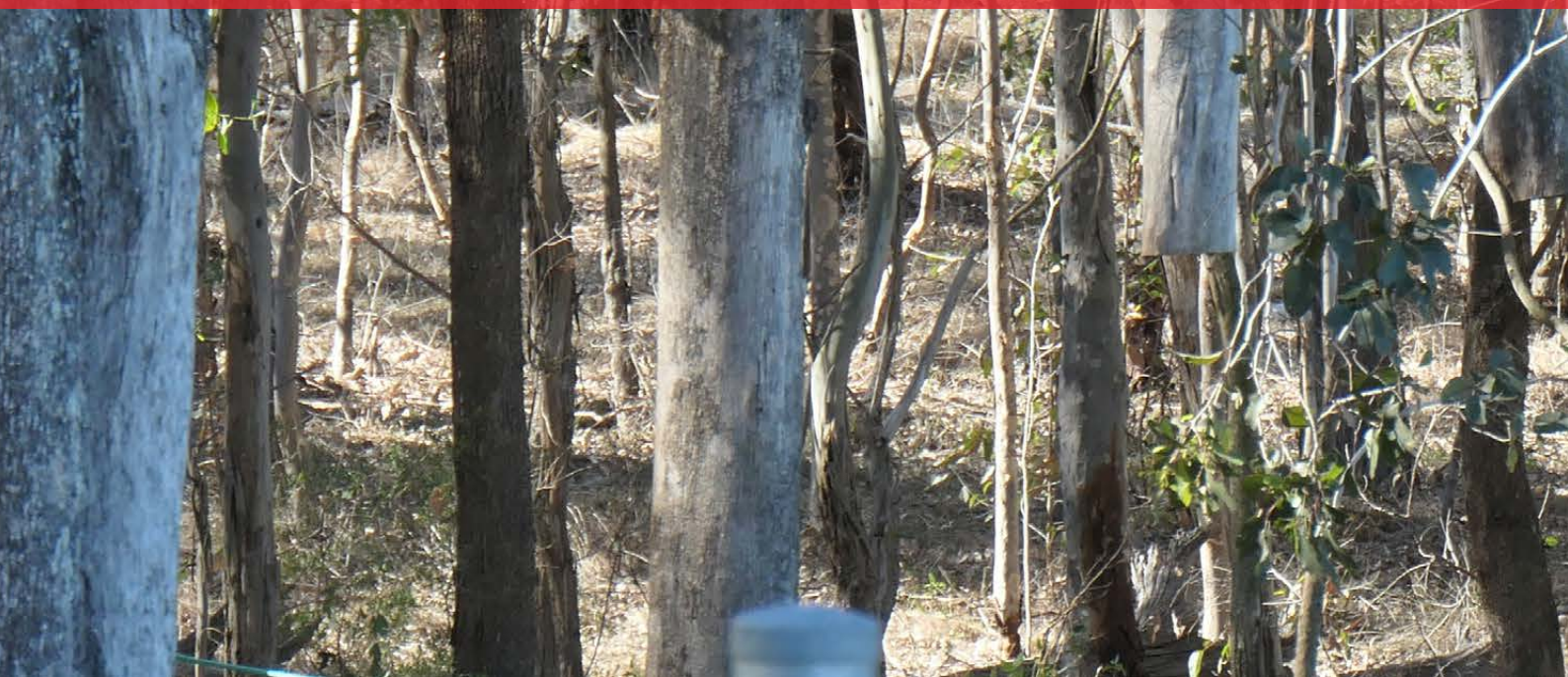
1. Continue and complete the GPS location and auditing of existing trees within the key activity hubs of the Parklands to help further identify and locate 'Significant' trees, understand the tree types and allow future analysis of the managed tree population. This will enable more informed tree management actions based on the actual species recorded, numbers of individual species and trees, their age classes and overall tree health and condition.
2. Further investigate and program a suitable operational plan for any weed tree removals and removal or pruning of trees that are impacting or impinging on tracks trails and car parking safety and sight-lines.
4. Undertake detailed tree planting plans for the activity hubs and identify the exact locations and extent of any new tree planting and the proposed species to be used.
5. Update and maintain a detailed operational plan for tree auditing and monitoring, and scheduled maintenance activities such as formative pruning.
6. Prepare and then utilise a suitable and simple 'minor works checklist' that should then be completed by all personnel or contractors prior to starting works that may impact on a nearby tree(s).
7. Review and update this Tree Management Plan at least every 8-10 years.



Figure 4.6 - The detailed operational requirements surrounding tree management are an important element and will be subject to periodic updates and changes as the population becomes better identified and future documents are then updated and produced.



Tree Protection



5.1 Overview

Tree protection is a very important part of the Tree Management Plan objectives because:

- Trees are an asset that represent a significant investment in both time and money.
- Significant remnant or historically significant trees may be largely irreplaceable and are important from both a natural and cultural heritage perspective.

Trees are dynamic 'living' organisms that can be very susceptible to damage, stress and declining rapidly if overly impacted by construction activities, extended drought or other disturbances. Trees take decades to grow but can be injured and killed in a very short time frame. This is particularly due to the irreparable damage to the often shallow, extensive and unseen root systems. It is rarely possible to repair a stressed or damaged tree after the damage has occurred.

The most critical tree management outcome for the existing trees of Western Sydney Parklands, is to maintain and protect the assets we currently have. Lack of coordination, or thought for trees by different disciplines, consultants and contractors who organise or carry out work within the Parklands can have significant impacts to the trees. Similarly, people who run events and activities in the Parklands can also accidentally damage the trees.

5.2 Important Definitions

Proper protection of trees, particularly through the establishment of appropriate Tree Protection Zones (or TPZ), is the key to minimising construction or event related impacts to our trees.

A TPZ means the 'minimum' area above and below ground at a given distance from the trunk to provide protection for the tree. Most importantly it represents the root zone required to be kept uninjured to maintain a healthy and viable tree. Roots will usually extend well beyond this zone, so this represents the minimum remaining root zone required, assuming all others are lost or damaged due to construction or other disturbance. It is typically calculated as a circle centred on the trunk unless existing site conditions indicate otherwise.

The Structural Root Zone (or SRZ) is the smaller area immediately around the base of the tree at a given distance from the trunk. The woody roots and soil cohesion in this area are considered vital to the 'structural' stability of the tree. Damage or removal of soil or roots from this area will typically render the tree unstable and require its removal. It is typically calculated as a circle, centred on the trunk, unless specific site conditions indicate otherwise.



Figure 5.1 - Trees are living organisms with both above ground and below ground parts. Trees can be very easily damaged by careless actions. Compaction of soils and damage to roots is one of the most serious impacts to our trees. Vehicle damage to trunks and large branches can also lead to increased pest and disease attack.

5.3 Planning and Design

Tree protection must follow the steps and principles outlined within AS 4970-2009 Protection of Trees on Development Sites. Tree protection must start at the planning stage of any proposed works, upgrades or repairs. Tree protection must not be an after thought.

It is essential the Trust either undertakes itself, or insists on a proper topographical and feature survey prior to starting the planning and design of any work. This is normal practice and should include the exact location, levels and details of all existing trees.

After this is completed, it should be issued to an AQF Level 5 Consulting Arborist who shall then complete a pre-development tree assessment. Ideally this should be done by the Trust and be issued to design or engineering consultants with their brief to inform all design processes.

The Consulting Arborist's recommendations and TPZ offsets should then be implemented by the design team for all trees intending to be retained. This is particularly important if designing within the vicinity of any significant trees. Significant trees must be given extra consideration.

As a rule, no work of any kind shall typically be allowed within SRZ's unless there are extensive non-destructive investigations undertaken and orchestrated by an AQF Level 5 Consulting Arborist to verify the proposals won't have any detrimental impacts.

All new works should be designed to avoid tree damage and impacts. Consideration must include not only the proposed works but also any proposed services, construction methods, construction access and final landscaping. Typically new work should be restricted to areas outside the calculated TPZs. There should be no cultivation of existing soils within TPZ. Any final landscaping should be installed within a 100-200mm thickness of newly imported and manufactured topsoil. Topsoils from other sites or of unknown origin shall not be imported. Use of plants of an appropriate size (typically smaller than 200mm container sizes) helps avoid damage to existing surface roots, when landscaping is undertaken around existing trees.

Tree protection is important even for small works. Minor works such as seat or furniture installation, service repairs etc. that may not involve detailed design or documentation should still give due consideration to tree protection. Employees or Contractors of the Trust should complete a minor works checklist prior to starting any work and confirm that the processes or methods they are intending to employ consider tree protection (both overhead and below ground).



Figure 5.2 - Trees are living organisms with both above ground and below ground parts. As indicated in this diagram, with only very few exceptions, most trees have extensive and very shallow root systems. It is vital these are adequately protected and thought about well before and then during any work around trees . (Source: International Society of Arboriculture)

The following outlines the process for managing Tree Protection within the Parklands. Where significant works are proposed and are to take place within the vicinity of any tree(s) the following process shall typically be followed:

- A detailed site survey shall be undertaken and a pre-development tree assessment completed and issued to the Trust and relevant design professionals.
- The project design and documentation shall be prepared in consultation with a nominated Consulting Arborist with a view to minimising the foreseeable project impacts on the adjacent tree(s).
- During and upon completion of the proposed designs, an Arboricultural Impact Assessment shall be undertaken by a suitably qualified Consulting Arborist (minimum AQF5) for all trees likely to be impacted by the proposed works. This shall include impacts for the construction access and all services. This shall clearly indicate what impacts, if any, are likely to be experienced and how they are intended to be managed or mitigated.
- A suitable Tree Protection and Removal Plan, clearly showing all the trees to be retained or removed and their the nominal TPZs shall be prepared by the Consulting Arborist to accompany the Impact Assessment, for the Trusts review and endorsement.
- As part of the formal Contract for any works a Tree Protection Plan and accompanying Specification shall be prepared that clearly shows the proposed extent of works and the detail and location of all the required tree protection measures that are to be installed and remain in place for the duration of the construction.

5.4 Tree Assessments and Designing for Trees

It is important that the recommendations of any tree protection plan are adhered to and checked. Prior to the commencement of any site works:

- Tree protection measures as specified in the required Tree Protection Plan and Specifications shall be installed, as documented, and must be certified by either a Trust Representative, or the nominated Project Consulting Arborist, as correctly installed prior to main works being allowed to commence.
- Major works contracts should include provision of monetary bonds or penalties to be placed on significant trees to provide additional incentive for the Contractor to manage the process and ensure protection of trees.
- Works contracts and engineering documentation shall also include stipulations for the installation of services, if they are occurring within a TPZ.
 - o No traditional open trenching shall take place within the TPZ of a protected tree,
 - o Services shall typically only be installed outside of a nominal TPZ or otherwise they will need to be under-bored to minimise impacts to protected trees. In rare circumstances the Trust may approve other non-destructive trenching methods to install minor services such as hand digging, vacuum extraction or air-spades.
 - o Advice shall be sought from the nominated Project Consulting Arborist regarding appropriate installation methods for any unexpected construction works within a nominated TPZ.
- Installation of final landscaping must also give due consideration to tree protection.
 - o There shall typically be no cultivation of existing topsoils within a TPZ.
 - o There shall typically be no trenching for irrigation or lighting within a TPZ.
 - o Appropriate topsoils shall be imported where required for the installation of small plant sizes around any retained trees. Building up of soils around the immediate vicinity of the trunk of the tree shall not exceed 100mm.

5.5 Required Minimum Protection Measures and Compliance

Site Inductions and Compliance with Tree Protection Requirements

Adherence and maintenance of tree protection measures, once installed is critical and must be managed. Any Contractors or Project Managers in control of the proposed works shall ensure that all contractors and subcontractors are inducted prior to working on the site. All inductions shall include a description and identification of the trees, their TPZs and the restrictions to work and activities with regard to trees.

All new project staff and contractors shall be appropriately inducted, as above, and brief “tool box” meetings shall be conducted at least once per week to ensure Tree Protection is maintained at the forefront of all project workers minds.

Tree Protection installed per Tree Protection Plans and the required offsets shall be enforced. Prior to the commencement of any site works and at appropriate intervals (minimum of monthly), the Trust representative (or the nominated Project Consulting Arborist) shall inspect the site to confirm, record and report back to the Trust:

- Whether tree protection is appropriately installed per the Tree Protection Plan,
- Confirm the status of the tree protection measures noting any breaches or shortcomings that need to be rectified in the tree protection measures.
- The condition of the trees, specifically noting any damage or visible deterioration of tree health since the previous inspection.

Temporary Tree Protection Fencing

All tree protection fencing shall be either 1800mm high galvanised chain wire or welded mesh with a minimum of one lockable gate into each separately fenced enclosure. Fence posts are to be minimum 50mm diameter galvanized steel posts. Excavated concrete footings are not permitted. Temporary above ground fencing must be bolted together and secured with all necessary back stays and bracing to prevent it being easily moved or blown over.

Star pickets and bunting or danger tape shall not constitute acceptable tree protection fencing.

Suitable signage as defined by AS 4970-2009 Appendix C shall be affixed to the external side of the fencing at a spacing of not less than 1 sign per 30 lineal metres of fence.

Controlled access to TPZ's

Typically no unauthorised access shall be permitted within the Tree Protection Zones once they are established. The following shall be specifically excluded:

- Placement of site sheds or parking of cars, trucks or any other machinery within the fenced TPZs,
- Stockpiling of materials, or installation of machinery washout areas within or immediately upslope from a TPZ or any other protected tree;
- The washing down of wheel barrows, concrete

pumping equipment, paint cans/brushes, acids etc. near existing trees (Whether fenced or otherwise).

- Fuel powered pumps or generators or air compressors;
- Storage of chemicals, fuel or other powered mechanical equipment;
- No refuelling or servicing of any vehicle or equipment within a TPZ.

Demolition and Ground Protection

Demolition of paths and other structures required within a TPZ shall be done with small tracked equipment or by hand, with care to limit damage and disturbance of the root zone. All such work within TPZs shall be directly supervised and overseen by a qualified Project Consulting Arborist.

Vehicular movement and access shall typically not be approved through the TPZ areas, however if it is necessary and it is proposed to create any access or haul road, or similar, the Contractor shall install rumble strips / boards over the TPZ ground surface. No excavation shall be allowed. The Contractor must first place a suitable permeable geotextile to the extent required and then a 100mm thick layer of wood chip mulch or coarse no-fines gravel over the extent to be covered with the rumble strip / boards. Then place hardwood boards (minimum 3600 x 200 x 75mm) on their flat edge, side by side, with a 30 - 50mm gap to form a rumble strip. These boards are to be held together with three galvanised metal



Figure 5.3 - Example of proper tree protection fencing used to define and protect the area around a tree.



Figure 5.4 - Example of proper ground protection when access is required through a Tree Protection Zone (TPZ).

bracing straps nailed to each board. The two outer straps are to be approximately 200mm in from the ends of the boards. The third strap is to be along the centre line of the boards.

Trunk and Branch Protection

Where movement of machinery or vehicles is likely to occur in close proximity to a tree, a trunk barrier shall be erected around the circumference of the tree or trunk flare and any root buttresses. This barrier will consist of a double layer of used carpet, carpet underfelt, or similar, placed around the trunk. A layer of timber battens is to be placed over the underfelt. The battens are to have a maximum spacing of 50mm. The height of the battens is to be a minimum of 2 metres or to the height of the first branches. Secure in place with galvanised steel bracing straps affixed to the battens. Do not screw or nail into, or otherwise injure, the tree trunk or bark. Battens may be made from any suitable waste timber of similar sizes and depths. All sharp or protruding edges are to be properly covered with tape or similar padding.

Temporary Irrigation and Mulching

In some instances, depending on likely impacts and the significance of the tree, temporary mulching and an irrigation system may be installed before and during any construction period. A temporary and automated (battery powered timer is sufficient) watering system to be placed within the TPZs to maintain adequate water to the retained trees and help maintain their health and condition. This can be a surface mounted 'residential-style' soaker hose or similar surface sprinkler system. It is to be surface visible and spray delivered so that its operation can be easily visible and verified. It should be on a designated supply line, separate from any other construction related water supplies to minimise its likelihood of being disconnected.

Typically, during spring and summer months it should be set to run for a minimum of 30 minutes every day, in the early morning. During, autumn and winter months it should be set to run for 1 hour once every week. The operation can be suspended temporarily in periods of extensive and prolonged rain.

The system is to remain in place for the duration of construction, or until the Project Consulting Arborist approves its removal. It may be removed to allow final landscape treatments to proceed. If accidentally disturbed or damaged by construction activities, it must be reinstated as soon as practicable.

Unless otherwise shown on the Tree Protection Plan, the Contractor shall mulch the entire extent of the TPZ with 75-100mm depth of ANL Forest Blend™ organic mulch or an approved equivalent.



Figure 5.5 - Example of proper trunk protection when work is required in very close proximity to a tree.



Figure 5.6 - It is often advisable to insist on temporary irrigation around significant trees to ensure they remain in optimum health while work is undertaken in close proximity or where some roots are likely to be impacted due to proposed works.

5.6 Events and Event Management

Events often involve the movement and setup of numerous large and small vehicles, stalls, marquees, generators, carnival rides and other mobile equipment. The event can then also draw very large crowds, some of which are forced through small controlled entry points. All of this can have very significant and potentially long lasting impacts to the Parklands's trees. The potential tree impacts that need to be managed during an event are summarised below:

- Ground surface damage and compaction of the tree root zones from intensive pedestrian traffic, vehicular traffic, loading and unloading of equipment, storage and stockpiling of materials, parking of vehicles, plant and equipment;
- Contamination of soils in the vicinity of trees from; accidental chemical spills, wash down/ cleaning of equipment, refuelling of generators and dumping or spilling of waste liquids;
- Damage caused by inappropriately attaching items, cables, ropes or signage to trees;
- Mechanical impact damage from passing vehicles and equipment and
- Physical damage to trees resulting from inappropriate patron activities.

The key considerations to minimise the potential tree impacts outlined in this section include: -

- Careful consideration of event site location layout and parking needs.
- Controlled vehicular site access and parking.
- Exclusion zones, fencing or other protections to avoid mechanical damage to trees (trunks and overhanging branches).
- Installation of temporary tree protection barriers and temporary ground surface protection wherever required to limit or prevent soil compaction.
- Communication with event organisers – mandatory site inductions to include and stress tree protection requirements.

- Event period security, active crowd supervision to prevent damage to trees during event, inappropriate parking or anti-tree behaviour.
- Careful planning and consideration of fuel storage and equipment refuelling.
- Careful planning and consideration of generator placement and the location of hot exhaust emissions.
- Implementing appropriate penalties or bonds to cover negligent tree related damage.

Event Planning

The Trust has prepared a simple Event planning protocol and information sheet. (Refer Appendix 8.2) This shall be given to all event organisers to facilitate them lodging a suitable event plan and considering tree related matters.

All event organisers must submit to the Trust at least 4 weeks before any planned event a detailed plan, preferably with reasonably scaled and accurate diagrams that clearly indicate the proposed location and extent of equipment being brought in or installed. This should also include the location of primary access points for bump in-bump out. The requirements for tree protection and consideration must be clearly communicated to event organisers during all negotiations and arrangements with the Trust to ensure it is not an after-thought.

Suitable contingency plans must be put in place should inclement weather conditions occur. Extensive rain prior to the event bump-in, for example, could make ground largely impassable to vehicles and greatly increase the risk of unacceptable soil compaction.



Figure 5.7 - Events within Western Sydney Parklands are common and need to be carefully controlled and managed to avoid tree impacts. (Image Source: www.australiandoglover.com/2018/07/street-paws-festival-western-sydney.html - accessed 25/9/19)

Well Considered Site Layouts

The best tree protection measure is to design the event layout to maintain adequate clearances between trees and any equipment being brought in or installed. Appropriate clearances will minimise the likelihood of both impact damage and soil compaction within the root zone of trees.

- Consider and maintain appropriate clearances to all lower branches of tree as well as to the trunk.
- Stalls and other facilities shall typically be sited to be accessed clear of trees and to be easily accessed from already hard paved areas or from ground protected walkways.
- When intensive pedestrian activity (eg. dance or performance areas) is placed under the drip-line of any tree that is only covered in grass or earth, suitable temporary ground protection matting shall be applied for the extent that is applicable under the tree's drip line.
- Generators shall be typically maintained and positioned at least 10 metres from any tree trunk. Exhausts from generators must not discharge towards trees or under tree canopies.

Controlled Vehicular Access, Vehicular Movement Supervision & Ground Protection

The movement of vehicles is of particular concern. Appropriate clearances and ground protection will minimise the likelihood of both impact damage and soil compaction within the root zone of trees.

- Primary site access points, heavy equipment installations and storage areas within close proximity to trees shall be clearly identified and have temporary ground surface protection matting or suitable plates installed per the approved site layout plans and event planning document.
- Vehicular access, the parking of vehicles, storage and installation of heavy equipment under any trees on the site shall typically be prohibited unless approved temporary ground surface protection matting or plates are installed per the approved site layout plans.
- Where vehicular access is required for 'Bump In' and 'Bump Out', under or through trees and the area is not already hard paved, the access way shall have temporary ground surface protection matting or plates installed per the approved site layout plan to limit soil compaction and tree root disturbance. This will be exceptionally important if any periods of wet weather are experienced within 7 days of the event or during the event.
- All vehicular movements in the vicinity of trees within the Parklands, particularly of vehicles greater than 3.5 metres in height and/or 8 metres in length, must be supervised by a 'spotter'. This must be an authorised employee or representative of the Trust to ensure compliance with tree protection standards. This is particularly important during the periods of most intensive vehicular activity during 'Bump In' and 'Bump Out'. All large items that are unloaded by crane or vehicle mounted lifting equipment should be subject to a spotter to limit potential foliage or branch impacts. The spotter must supervise the truck movement and signal to the driver, warning of any possible conflict to be avoided between the truck, its load and nearby tree branches and trunks. Alternative access arrangements must be implemented if the truck cannot safely fit under existing tree branches. No tree branches are to be pruned or snapped off.
- If a truck must leave a paved pathway to avoid any low hanging trees, suitable ground protection mats or plates must be placed over the grassed areas being travelled by the vehicle.
- The nominated Event Manager is to ensure strict compliance by all suppliers and delivery personnel to prevent tree damage.



Figure 5.8 - Events, although great things, can have devastating and lasting affects on tree health. Soil compaction caused by vehicles and foot traffic needs to be carefully managed. Vehicle impact damage to trunks and branches during bump-in and bump-out periods is also a critical consideration that needs to be managed. (Image Source: www.concreteplayground.com/sydney/event/Parklands-food-fest-2019 accessed 25/9/19)

Communication-ToolBoxMeetingsand Site Inductions

- Event organisers shall ensure that all Contractors and stall operators are appropriately inducted prior to working on the site. Tree protection shall be a key component in the site induction and must be maintained at the forefront of event workers' minds.
- All site inductions shall include explanation of exclusion zones and description and identification of the tree protection protocols and the restrictions to access and activities with regard to maintaining tree protection.

Generators,FuelStorageandEquipment Re-fuelling

- Any on-site, bulk fuel (fuel cells) shall be stored a minimum of 15 metres away from the trunk of any tree.
- Generators, or other powered equipment (light towers, portable cold rooms, etc.) shall typically be positioned at least 10 metres from any tree. Exhaust emissions shall be directed away from any overhead canopy or branches
- Equipment refuelling is to be carried out with extreme care to prevent spills or overflow.
- Refuelling shall be done a minimum of 10 metres from the trunk of any tree with appropriate bunding and ground protection in place.
- A 'fuel spill management kit' is to be on hand at the location of all refuelling activities.
- All refuelling is to be carried out by a team of two people. One to control the filling mechanism the other to observe the integrity of the equipment, manage any malfunctions and efficiently deploy the spill kit in the event of any fuel spill.

Event Security & Crowd Supervision

The Event organisers shall ensure the event security team and other event volunteers are briefed to ensure they actively engage with patrons to particularly prevent adults and teenagers from climbing trees during the event, to minimise the likelihood of tree limb failure and injury to patrons. Security and volunteers shall also be vigilant to prevent intentional or accidental vandalism to trees.

Penalties for Tree Related Damage

Consideration shall be given by the Trust to (depending on the size and purpose of the event) imposing contractually enforceable penalties that may be charged against event organisers should their Contractors or stall-holders be found to have caused damage to trees.

Penalties shall be structured to place a monetary value on the tree as a whole in case of serious damage or death of the tree, and also pro-rata "damage" penalties for any damage caused to part of the tree. This should typically be based on the size of the component damaged (ie. root or branch) using a predefined and agreed formula.

Extreme Weather Events

In the process of event planning, due consideration should be given to the possibility of extreme weather impacting upon the event. The risk of tree failure is greatly elevated during periods of heavy or prolonged rain or during strong wind conditions.

Consideration should be given to how the event will be managed to minimise risks associated with possible tree failures in the event of extreme weather conditions. Winds of gale force (8 on the Beaufort scale or in excess of 63-75km/h) present a serious and real risk to trees. Even healthy trees with no observable defects may fail in such high wind conditions. Branches may break out of trees and trees may even be up-rooted, particularly if preceded by periods of prolonged or heavy rains. It is recommended that the events typically be suspended and the site evacuated should winds of this level be experienced.

5.7 Trees Within Parking Areas

Trees planted within and around parking areas are important. They provide valuable shade and definition to parking areas. They are particularly vulnerable, however, to damage from careless or thoughtless drivers. Extra protection and thought is needed around trees in parking areas. The Trust will monitor and consider distances and offsets to existing and any new tree planting. Wherever possible and feasible suitable wheel stops or barrier kerbs shall be installed around trees to provide at least 1 metre clearance to any tree trunks. Bollards or fencing should typically be avoided as these are subject to damage by vehicles and may cause damage to tree roots if they are installed around an existing mature trees. If an existing tree does not have any protection and is subject to potential damage suitably weighted and surface mounted barriers such as aesthetically appropriate precast concrete or stone bollards or blocks shall be used.

Overflow parking areas, when used, must be appropriately controlled and properly barricaded and defined to prevent vehicles impacting with tree trunks or branches or more significantly causing soil compaction that may impact existing trees or groups of trees. If this cannot be reasonably avoided, the Trust shall look at alternative locations for entries and access driveways that avoids ground compaction around trees or install a suitable permanent and low key but effective pavement surface that manages this problem for overflow parking.



Tree Planting

6.1 Overview

If a tree is well planned for, well selected, well planted and well established in its early years, it should in theory require only minimal ongoing maintenance and will provide maximum value for the resources expended. Tree planting can represent a significant investment in money, time and resources. Trees should be viewed as a long term asset that may have a useful life in the order of 80 to 150 years, or even much longer for some species. It is important to get it right.

The planting of trees is a more complex process than some may think. It involves identifying an appropriate location, ensuring the species is appropriate, ensuring the location of services or surrounding infrastructure won't be impacted by the tree, excavations by machine or by hand, disposal of excess spoil, installation of new soils, ensuring drainage is sufficiently catered for, planting the actual tree, mulching, and then potentially the installation of staking and tree guards.

The time and expense involved is largely wasted if the tree dies shortly after planting and requires subsequent replacement. It is also poor practice if the tree presents unacceptable maintenance burdens or damages existing infrastructure in the future. It is therefore essential that each tree is positioned correctly, in optimal condition when planted, and that the method of planting, protection and establishment is a consistently high standard.

To ensure the optimum return on all investments, we shall endeavour to undertake 'best practice' tree planting using the following regime.



Figure 6.1 - Planting a tree needs to be done the right way to ensure the survival of the tree and maximum returns on investment. Poor planting practices inevitably lead to plant failures and wasted time and money.

6.2 Planning, Design and Heritage

While retaining and protecting existing trees must be a priority, it is important to remember that trees naturally grow, age and ultimately die. On this basis a plan for propagation and replacement planting also forms part of a Tree Management Plan.

Good tree planting begins long before anything is planted in the field. Careful pre-planning is required to ensure the planting is appropriate on a number of levels. Consideration must be given to each of the following items.

Natural or cultural Heritage

- Is the planting a replacement for any dead, dying or previously removed tree with documented natural or cultural heritage significance?
- How does the proposed planting relate to the biodiversity or heritage values of the Parklands, with regard to the species, size, and its location?
- Does the proposed planting impact on potential archeological elements or critical Aboriginal sites. Project managers to undertake relevant due diligence enquiries and assessments?

Critical views

- Does the new planting impact on any important views and vistas within the Parklands?

Provenance of seed or plant stock

- If the trees are endemic species, the seed or other propagation material should be from a known provenance source to maintain the genetic integrity of the trees.
- If the proposed tree is part of a succession plan for a significant heritage tree(s) then it should be propagated and grown from material that has a connection to the original plant. This may be via seed, cuttings or other methods that continues the historical connections with the given tree.
- Other general amenity trees should be sourced from trees that don't possess any known or inherent genetic flaws, that may detract from the trees habit or cause structural issues in the trees as they age. For example trees with a known propensity for included branch bark unions should be avoided. Trees that seed prolifically, may be sourced using cultivars that are reliably 'sterile' to limit future maintenance or weed issues. Trees that have a strong propensity to 'sucker' should also be avoided, particularly near playgrounds and other facilities.

Planning & preparation for planting

- How many trees are to be grown and planted?
- What size is the tree stock grown to prior to planting? - There is always a trade off between size and cost and the time required to prepare the plants.
- Where is it being planted? Will it have any potential archaeological considerations or underground services or other heritage issues.
- Will the tree planting pit be of adequate size and appropriately prepared? Larger tree container sizes will require larger planting hole preparation. Are the soils adequate to accommodate the tree or will they require further amelioration or the installation of subsurface drainage?
- Are there appropriate clearances from surrounding infrastructure above and below ground to allow the tree to flourish to its full mature size with minimal potential impact? It should be noted that some level of interaction between trees and infrastructure may be tolerated in return for the amenity and the benefit the tree provides at its mature stage. Zero tolerance to infrastructure impacts is not always realistic. In new areas consider the fully grown size of the tree and avoid planting trees in too small tree surrounds, particularly when within fully paved areas or near walls, structures and playgrounds.
- Avoid planting in heavily compacted soils that are unable to be ameliorated. Particularly avoid planting within decomposed granite surrounds, wherever possible, as this surface usually limits suitable air and water penetration around the trees and leads to substandard tree health and growth rates.



Figure 6.2 - For endemic trees it is important that they come from local provenance to maintain genetic integrity. Likewise when replacing significant trees, it is important to maintain the connection with the original tree and planting by propagating from the original trees wherever feasible.

What time of year is the planting planned to occur?

- Is the timing appropriate for optimal results? Spring and Autumn are normally the best times to plant a new tree. Planting should be avoided in the heat of summer or the potential frosts of winter.
- Are other special preparations or maintenance activities required due to sub-optimal timing requirements?

6.3 Species Selection

When we plant any tree within the Parklands, we need to make sure the proposed species is appropriate. The species selection should relate to the naturally occurring vegetation types that would have occurred in an around the Parklands.

Designers should consult the most current versions of the Western Sydney Parklands's Design Manual and the Western Sydney Parklands's Biodiversity Strategy. Figure 6.3 presents the broad location and extent of the vegetation communities and these should guide the principle tree planting selections depending on where the planting is being undertaken and the dominant tree species that would have made up those communities.

If planting in amenity areas some other species may also be considered but they should be very carefully selected. This involves considering:

- Environmental Conditions. Any tree planted must be appropriate to the local soils, drainage and microclimatic conditions. It is unrealistic to expect trees that are not well suited to overcome these inherent issues and will inevitably fail or present an unnecessary maintenance burden on the Trust.
- Size. Is the ultimate size of the tree properly considered and will there be enough space around the tree and in between other trees. Surrounding trees and overshadowing can easily suppress or alter the proper form of the tree and render it permanently disfigured.
- Type of Tree. Trees can be evergreen, deciduous, various forms (fastigate or broad spreading). Will it provide dense or dappled shade?
- Other Issues. Does the tree present any known allergy or irritant problems, does it have any known pest or disease susceptibility, is it likely to become an environmental weed? Is it known for excessive limb drop, fruit or flower shedding? All of these should be weighed up before the final selection.
- Views and screening. Will the tree potentially impact or detract from important views? Will it provide the required screening desired?. Different trees have different inherent heights and density of foliage. Will it block view lines between pedestrians, cyclists and vehicles?

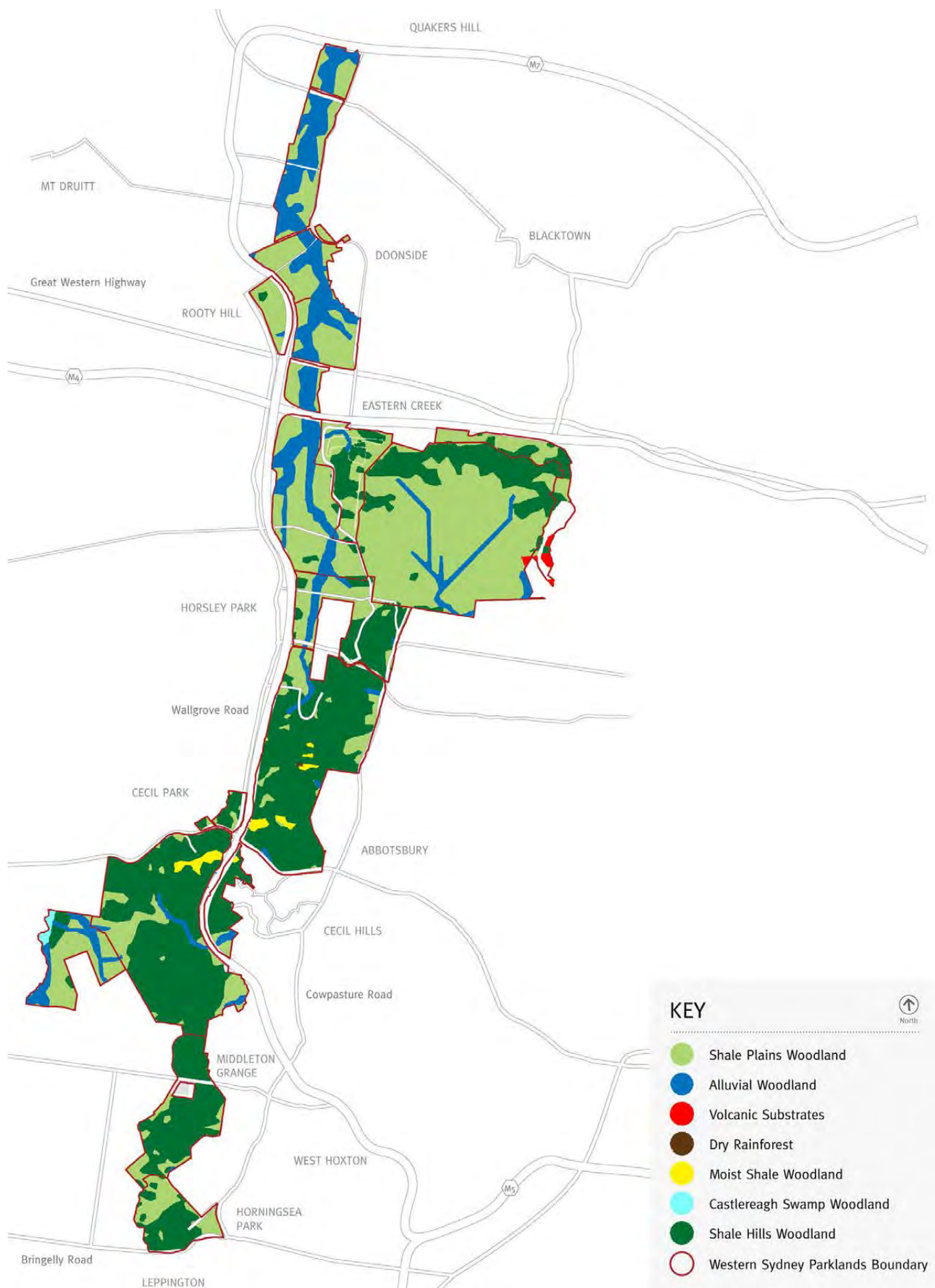


Figure 6.3 - Map of the Western Sydney Parklands illustrating the assumed natural plant communities that would have existed in the Parklands. The communities should guide future amenity tree planting, based on the dominant trees that would have flourished in those areas (Source: WPT-Biodiversity Strategy)

The tables below outline examples of the tree species that should be avoided or considered within the Parklands. These should form the basis for most proposed planting programs in and around the main activity hubs. Other species may also be considered, but only with very strict vetting by the Trust.

The Table 1 outlines some exotic and non-endemic tree species that should be avoided for future planting due to their potential weediness or invasiveness. Their use could degrade the biodiversity values of the Parklands and surrounding native areas.

Table 1 - Trees that should be avoided within the Parklands	
<i>Celtis australis</i>	Southern Hackberry
<i>Corymbia citriodora</i>	Lemon-scented Gum
<i>Grevillea robusta</i>	Silky Oak
<i>Harpephyllum caffrum</i>	Kaffir Plum
<i>Jacaranda mimosifolia</i>	Jacaranda
<i>Phoenix canariensis</i>	Canary Island Date Palm
<i>Pinus radiata</i>	Monterey Pine
<i>Pinus pinea</i>	Stone Pine
<i>Sapium sebiferum</i>	Chinese Tallow Tree
<i>Ulmus parvifolia</i> (non-sterile varieties)	Chinese Elm

Table 2 outlines the tree species that are likely to have occurred naturally in, and around, the Parklands environment and are considered horticulturally suitable and worthy of being used in the future in activity hubs.

Table 2 - Endemic Tree Species Suitable and Recommended for Use within the Parklands	
<i>Alphitonia excelsa</i>	Red Ash
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Angophora subvelutina</i>	Broad-leaf Apple
<i>Casuarina cunninghamiana</i>	River She-Oak
<i>Casuarina glauca</i>	Swamp She-Oak
<i>Corymbia maculata</i>	Spotted Gum
<i>Eucalyptus amplifolia</i>	Cabbage Gum
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark
<i>Eucalyptus fibrosa</i>	Broad-leaved Ironbark
<i>Eucalyptus moluccana</i>	Grey Box
<i>Eucalyptus tereticornis</i>	Forest Red Gum
<i>Melaleuca decora</i>	White Feather Honey Myrtle
<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark
<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark

Table 3 outlines existing amenity trees and some potential additional tree species that are considered suitable for further Parklands planting. This list is based on a considered assessment of tree suitability with relation to existing and potential future climate changes, Western Sydney soil conditions, tree architecture, tree character and aesthetics, hardiness and relationship to similar trees that may have been used in the past. This list is by no means exhaustive, but should form the basis for consideration in proposed future tree and planting designs.

Table 3 - Recommended Potential Non-endemic Trees for General Parklands Amenity Planting in Activity Hubs or for Feature Planting	
<i>Acacia binervia</i>	Coastal Myall
<i>Afrocarpus falcatus</i>	Outeniqua Yellow-wood
<i>Agathis robusta</i>	Queensland Kauri Pine
<i>Araucaria cunninghamii</i>	Hoop Pine
<i>Araucaria bidwillii</i>	Bunya Pine
<i>Brachychiton acerifolius</i>	Illawarra Flame Tree
<i>Brachychiton discolor</i>	Queensland Lacebark
<i>Brachychiton populneus</i>	Karrajong
<i>Cupaniopsis anacardiodes</i>	Tuckeroo
<i>Elaeocarpus reticulatus</i>	Blueberry Ash
<i>Eucalyptus microcorys</i>	Tallowood
<i>Ficus macrophylla</i>	Morton Bay Fig
<i>Ficus microcarpa</i> var. <i>hillii</i>	Hill's Weeping Fig
<i>Ficus obliqua</i>	Small-leaved Fig
<i>Ficus rubiginosa</i>	Port Jackson Fig
<i>Flindersia australis</i>	Crows Ash
<i>Harpullia pendula</i>	Tulipwood
<i>Livistona australis</i>	Cabbage Tree Palm
<i>Lophostemon confertus</i>	Brush Box
<i>Magnolia grandiflora</i>	American Bull Bay Magnolia
<i>Pyrus ussariensis</i>	Manchurian Pear
<i>Quercus acutissima</i> var. <i>acutissima</i>	Sawtooth Oak
<i>Quercus cerris</i>	Turkey Oak
<i>Quercus ilex</i>	Holm Oak
<i>Quercus lusitanica</i>	Lusitanian Oak
<i>Quercus virginiana</i>	Live Oak
<i>Waterhousea floribunda</i> 'Green Avenue'	Weeping Lilly Pilly
<i>Schinus areira</i>	Peppercorn Tree
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly
<i>Toona ciliata</i>	Red Cedar

6.4 Stock Sourcing and Quality Control

This aspect is vitally important. Most problems in older trees stem from originally poor or flawed nursery stock. The supply of very good quality stock, including their root structures, will minimise the requirements for ongoing intervention and reduce the time and cost per tree for establishment and ongoing maintenance over its life.

- All new trees should be propagated from seed or cuttings of known provenance. Replacement of heritage or endemic species trees should be propagated from seed or cuttings that are sourced from the existing local population wherever possible. Other species should be sourced from similar climatic and soil landscapes.
- At a minimum, all new tree stock shall conform to AS2303-2015 Tree stock for landscape use or the NATSPEC guide "Specifying Trees: a guide to assessment of tree quality" by Ross Clark 2003 and must be certified as conforming by the suppliers.
- All trees should be inspected, prior to their acceptance or delivery, by an appropriately qualified representative of the Trust and certified as meeting the above quality requirements. If any trees fail any of the critical quality standards they should be rejected and not planted.



Figure 6.4 - Trees that are grown to best practice standards is essential to ensure that the trees are free of defects that may impact on their long term health and stability.

6.5 Final Position and Placement

Where should trees be positioned? Has the relevant Aboriginal heritage checks been undertaken (AHIMS) by the controlling personnel.

When finally placing the tree the people installing it need to look up, look down, and look around. Is the tree appropriately positioned with regard to all the surrounding constraints? This must particularly consider the ultimate size of the tree and the likelihood it will be growing and increasing its size for many decades. It is often far too easy to forget the ultimate size the tree, its trunk and roots, will attain.

Trees must be correctly positioned with regard to existing or proposed infrastructure. When planting trees within the Parklands, consideration shall be given to the distance the tree is from:-

- road kerbs and edging;
- edge of pathways and cycleways;
- playground apparatus and the future climbability of tree;
- underground services and pits, including irrigation and power;
- light poles, lights and CCTV cameras;
- nearby buildings, shelters and awnings;
- gates and the required clearance for gate opening or swings;
- signage;
- building openings, solar collectors and digital receivers;
- fences and the future climbability of the tree;
- existing adjoining or other future proposed trees.

The following table outlines the minimum standards that will typically be applied for all new tree planting, as well as for any self sown seedlings that may inadvertently occur.

Table 4 - Minimum Planting Clearances	
Layout, Item or Consideration	Typical minimum distances or other requirement
Major Services & Stormwater Inlet Pits - distance from nearest edge of pit structure	2.0m
Minor Infrastructure Pits (eg. irrigation and water valves etc.) - distance from nearest edge of pit structure	1.2m
Masonry Buildings - distance from nearest wall or footing	3.0m
Lightweight / Non-Masonry Buildings or shelters - distance from nearest wall or footing	2.0m
Building Awnings & Canopies – where they project out from the structures. Distance from overhead structures taken as the vertical alignment projected to the ground and the centre of the trunk	1.0m
Pathways – distance from nearest edge of path to the centre of the trunk	2.0m
Inflexible Kerbs and Edges – distance from nearest point of edging to the centre of the trunk	1.0m
Playground Equipment and Required fall Zones (including extent of any moveable items) – distance from apparatus to the centre of the trunk	1.5m
Fencing – distance from fence to the centre of the trunk	1.5m
Fencing – distance from fence to the centre of the trunk if clear stem of 1.8 metres is achieved at time of planting and fence is not a masonry fence with below ground footing	0.5m
Gate swings and opening – distance from any projected and required gate swing path to the centre of the trunk	0.8m
Light poles/ CCTV – distance from pole to the centre of the trunk	3.0m
Signs – distance from pole to the centre of the trunk on the visible side of the sign	2.0m
Existing Mature Trees – with low and overhanging canopy	Ensure new trees are not planted under or within the projected canopy of any existing trees, particularly if they are low or dense.
Adjacent to new or proposed trees – distance between centre of the trunks for row or avenue planting	Not less than 4m for small trees Not less than 8m for medium sized trees Not less than 15m for large trees

6.6 Planting Standards

All new tree planting works will be completed to a high standard and will be directly supervised by qualified personnel trained in best practice tree planting. A detailed set of specifications has been developed by the Parklands and will be followed by any appointed Contractors when planting trees. A standard tree planting 'detail' is also provided as an Appendix to this Plan.

As outlined, the money and resources allocated by the Trust for planting a tree will be wasted if the tree is not planted properly and then well cared for during its most vulnerable time. The critical factors generally considered are:

- Ensure depth and diameter of the planting hole is sufficient for good early root growth.
- Drainage, aeration and soils are key, and the likelihood of any poor drainage should be checked through simple site tests and rectified wherever possible through the installation of appropriate drainage infrastructure, soil improvements or use of slightly raised planting areas where necessary.
- Soil improvement such as a wetting agents, and growth stimulants, and water saving polymers such as Terracottem™ are recommended and will ensure maximum chances for tree survival.

- Careful plant handling and pre-planting watering after delivery are critical. Any plants that wilt prior to planting or are damaged during unloading, placement or planting operations should be immediately rejected and replaced.
- Ensuring the tree is planted at the appropriate level. The top of the containerised rootball must be maintained level with the finished surrounding surface, or just above, and must not be buried or covered over by backfill soil.
- Mulching. All trees should be generously and appropriately mulched with appropriate organic mulch for a diameter of at least 3 metres (1.5 metre radius). (except for small tubestock)
- All planting should be supervised and overseen by an AQF Level 3 Arborist or Horticulturist.
- Root barriers and other root direction devices are typically not recommended and will only be used under strictly controlled conditions and only when the specific tree placement or other overriding outcomes dictate.

The following table provides a summary of the best practice procedure for tree planting and must be rigorously followed.

Table 5 - Recommended 'Best Practice' Tree Planting Methodology

Item	Timing	Comment
Excavate planting hole to optimum depths and diameter	At the time of delivery of stock or before, depending on scale of planting and size of hole required	Depth shall typically be at least the depth of the supplied container plus 100mm. The diameter shall be at least 3 x times the diameter of the supplied container diameter. This may need to be varied, however, for sites that have identified archeological impacts.
Assess and check drainage in planting hole or area	At the time of delivery of stock or before, depending on scale of planting and size of hole required	Ensure free draining and rectify through appropriate means if drainage is impeded. Suspend planting operation if serious concerns are observed. Partially fill planting hole with water and observe infiltration rate.
Ensure safe handling of stock at delivery	At delivery and installation	Always lift by handles on bags or pots. Large trees are to be lifted by machines taking majority of weight via rootball. Avoid lifting by trunks at all times as this often causes injury. Avoid rough handling or relocating tree using the trunks or branches.
Water stock immediately upon delivery	At delivery and then daily until planting	Water directly on to the rootball using suitable soft spray nozzles and then water daily if the stock is not installed immediately.
Water stock well immediately prior to planting	Just prior to installation	Saturation of rootball should be achieved approximately 2-3 hours prior to planting
Prune rootball extremities	Just prior to installation or before backfilling for very large stock	'Shave' the entire sides and bottom of rootball by 10-15mm using a clean and very sharp spade or saw or knife to trim of any encircling roots and promote good root direction and division.
Plant the tree with appropriate 'North' orientation	At installation	North should be indicated by N or a paint mark line on the container of trees that are >45L
Plant at the correct depth and ensure trunk is vertical	At installation	Ensure rootball crown (top) is maintained at existing site soil levels or just above, particularly if drainage is in anyway compromised. Build up small pad of well consolidated site or imported soil under the rootball to prevent any settlement. Adjust levels of tree to ensure tree is planted in a balanced orientation and trunk is not leaning.
Backfill the planted tree	At installation	Backfill with appropriately firmed and consolidated layers of soil and in the correct profile of soils. Avoid deep burial of any rich organic matter or over compaction of the soils. Incorporate ameliorants as required and ensure rootball crown is not buried or covered over by backfill soils.
Water once installed	At installation	Ensure thorough watering of rootball and surrounding soil immediately after installation using a suitable soft spray nozzle. Irrigation to be installed if available.
Support the tree if required	At installation	Trees should not require staking but if the tree is not fully self supporting or exposure to extreme winds is likely, provide a temporary timber stake and loosely applied hessian strapping support as per standard planting details and specifications.
Establishment maintenance	24 months following installation	Apply regular watering, and slow release fertilising and formative pruning as per establishment maintenance procedures outlined.
Documentation and replacements	At installation and then every 12 months	Trees shall be entered into the Trusts database of trees with their species, date of planting and supporting photographs. Damage or failures of trees to be recorded and appropriate replacements undertaken.

6.7 Establishment Maintenance and Protection

The maintenance of planted trees shall commence immediately following their installation, and then be continued for a period of no less than twenty four (24) months to ensure their successful establishment within the Parklands. After this period the maintenance of the tree shall fall into the general requirements outlined in the following Section 7.0 - Tree Risks, Ongoing Maintenance And Removals.

The tree establishment maintenance shall typically be focused on:

- Maintenance and monitoring of any appropriate protection methods and staking with removal of any stakes or guards as soon as the tree is satisfactorily established and unlikely to be subject to further foreseeable damage.
- For smaller trees appropriate vermin control (particularly from rabbits or similar) may need to be implemented, but again this should be removed as soon as practicable.
- All newly planted trees should be regularly assessed for their watering requirements. Appropriate supplementary watering applied whenever necessary during the first 24 months will help ensure the trees continue to thrive, despite adverse weather conditions. Care should be exercised by staff and Contractors to ensure trees are not over watered, which often present with similar symptoms to lack of water.
- An appropriate slow release fertiliser shall be applied prior to the completion of the establishment maintenance period to ensure the surrounding soil is provided with all essential nutrients and trace elements prior to transferring to general ongoing tree maintenance regimes.
- Assess and undertake any formative or clearance pruning. If trees are appropriately grown and sourced from reputable nurseries, the need for formative pruning should be minimal. Within the first 24 months following planting, however, each tree should be inspected at least once by an AQF Level 5 Arborist and formative pruning shall be carried out, as required, to correct any visible growth defects, poor branch structures or to achieve, or start to guide appropriate long term clearances to other assets. If this is done when pruning wounds are less than 50mm in diameter, the young tree will usually quickly compensate and seal the wounds, and is far preferable to allowing serious defects to develop in a more mature tree.
- Replace any failed, vandalised or otherwise damaged trees within a timely fashion.



Figure 6.5 - Once planted it is equally important to ensure the tree is well cared for during the first 2 years while it is extremely vulnerable to damage and environmental stresses. Once well established, the tree, if properly grown, planted and selected should then require only minimal ongoing maintenance for the rest of its life.



Tree Risks, Ongoing Maintenance and Removals



7.0 Tree Risks, Ongoing Maintenance and Removal



7.1 Overview

Trees are one of the most difficult and complex elements to manage in an urban Parklands environment. They are living and dynamic items that respond to, and interact with their surrounding environment.

Inappropriate maintenance such as improper pruning can also impact the trees, leading to increased risks of failure, inappropriate reductions of all-important foliage and increased risk of pathogen attack or decay. Lack of care and control of hygiene can also lead to the inadvertent spread or introduction of diseases around the Parklands.

Trees will drop leaves, bark, fruit, cones, flowers and sometimes even branches. Trees offer habitat for birds and animals, that may also cause nuisance and unwanted mess. This is an inevitable natural process and part of the trees' living and growing. Just because a tree does these things, does not immediately mean it is a problem or dangerous. We need to accept many of these things in return for the many environmental, aesthetic, social, heritage and economic benefits they provide.

In natural environments, trees can live, die and fail with little or no detrimental impact to humans. However, in more highly used and urban setting such as Western Sydney Parklands activity hubs and trails, trees need to be proactively managed. Tree risks are not equal for all areas of the Parklands. Large trees, in close proximity to heavily used areas and in the declining stages of their life will need far different care, monitoring and approaches than small trees in the middle of a wooded area, that is seldom visited.

While tree maintenance is a necessity in an urban setting, if the tree is well planned for, well selected, well planted and established in its early years it should, in theory, require only minimal ongoing maintenance. Every tree will have a lifespan and at some point will need to be removed. We must remember, however, that not every tree within the Parklands had the benefit of excellent planning, selection and planting. Therefore, we also need to manage trees that exist within the Parklands that may not be well positioned or the most appropriate species. Sometimes factors well outside of the Trusts control may also impact upon trees and require intervention.

The main tree maintenance activities that we will carry out are:

- Management of identified and unacceptable tree related risks to life and property,
- Tree pruning for clearances, sight-lines, improvement of tree structure, or reduction of risks,
- Tree removals due to risk, tree decline or management of undesirable environmental or heritage impacts,
- Tree surround maintenance such as mulching, fertilising, soil improvement and occasional supplementary watering,
- Pest and disease monitoring, and where feasible and economically realistic, control.

The Parklands cover a very large area and contains a large number of trees. We also have a limited budget to maintain all of the Parklands trees and other facilities. The management of the tree assets, like other elements, has to be prioritised. We employ staff and Contractors to manage the Parklands and have prepared detailed technical specifications for maintenance, including tree maintenance. Tree work shall be undertaken in line with these specifications. Importantly, part of this Contracted service, includes the inspection and monitoring of certain trees within our care and control. Over the next two to three years, all trees within the main activity hubs will be inspected and recorded. This will provide the Trust with more accurate information regarding the current tree population and will fulfil the Trust's obligation for a reasonable duty of care. It is intended this inspection regime is then ongoing so that each tree in these more heavily used areas are visually inspected for issues or defects, at least once every 3-5 years and in some instances, more frequently.



Figure 7.1 - In a complex urban setting, trees will always require some ongoing maintenance, to ensure that Parklands users and amenity values are protected. Also, not every tree has had the benefit of best practice selection, placement and care in the past. The nature of tree maintenance will be very dependent on the species and its location within the Parklands.

7.2 Tree Related Risk Management

Trees provide substantial benefits. They are also living elements and potentially large structures. They will live, decline and die and therefore may present a variety of risks to Parklands users throughout their life. We all accept a certain level of risk as part of our daily lives. The provision of 'No risk' is not a realistic prospect.

It is important to note that any tree can fail, even healthy trees. This failure can be for a very large variety of reasons, both natural and man-made. Defects in trees are not always visible. They may be internal, very high up or below ground. Appropriately trained professionals can identify some defects and symptoms that may relate to an increased risk of failure.

The trust will inspect and monitor the trees within the activity hubs of the Parklands on a regular basis to fulfil our obligation of a reasonable duty of care. The rigour and frequency of these inspections will be dictated by the:

- location and level of use surrounding the tree(s)
- size of the tree(s),
- historical or environmental significance of the tree(s)

The basis of our tree risk management will be through the use of a formally accepted tree risk assessment protocol. This is a systematic process that provides information to make informed decisions that promote the safety of people and property while enhancing tree benefits, health, and longevity. The assessment of tree risk currently adopted by the Trust is the engagement of appropriately trained professionals that are qualified in an internationally recognised tree risk rating system, being either:-

- the Quantified Tree Risk Assessment (QTRA) System or
- the International Society of Arboriculture's Tree Risk Assessment Qualification (TRAQ)

Tree risk management is not about precisely predicting or preventing tree failure. Tree risk management is about taking a systematic approach to broadly identify tree related risks and then determining, by some uniform method, the probability of a tree failure event and its likely consequence. Trees with even a very high risk of failure may be completely acceptable in areas that are seldom visited. Conversely trees in very highly used areas may need to be actively managed or even removed to manage risk. The levels of acceptable risk may also be affected by the relative importance of the tree to the Parklands. In some instances, for very important trees we may have to tolerate an elevated level of risk.

It is our role to manage tree related risks to an 'acceptable' level, but often there can be a gross disproportion between the cost of risk mitigation compared to the 'risk of harm'. For example if the risk is very remote or the consequence of failure is relatively minor it may be completely unreasonable to spend hundreds or thousands of dollars to reduce the identified risk any further.

The frequency of inspections shall be undertaken using the following guideline:

- Important trees with a previously identified elevated risk of harm shall be undertaken annually
- Trees in highly used portions of the Parklands or within 20 metres of significant property assets such as major playgrounds, historic structures, significant shelters or toilet facilities, and car parks shall be undertaken annually
- All other areas with the main activity hubs at least once every 5 years.

A rudimentary 'windshield or walk by inspection' of the activity hub trees in facility areas shall be conducted within 48-72 hours of any major or significant storm event.



Figure 7.2 - Trees are living things and made only of wood. They will inevitably drop leaves, fruit and even branches. This does not immediately mean that tree related risks are unacceptable. Tree related risk needs to be evaluated in relation to the location of the tree, the likelihood of failure and the level of damage and injury we are prepared to tolerate in return for the benefits the trees provide. A recognised and systematic approach is needed to evaluate tree related risks. The imposition of 'no risk' is not realistic or achievable. We all accept some level of risk in our daily lives.

It is important to understand the 'costs' involved in tree risk mitigation are often not just a monetary measure. The impact of unnecessary pruning or removal of a significant tree must also be considered as a 'cost'. Aging or vulnerable trees may not recover from extensive pruning works. As very important trees age and decline, and the level of risk from their failure becomes unacceptable (as determined by a recognised system), rather than pruning or removal, a more appropriate course of action may be to simply exclude public access from around the tree. This will remove the potential targets and consequently lower the risks.

Ultimately what is deemed an acceptable level of tree related risk will be impacted by a number of variables including:

- The significance of the tree (heritage, environmental, aesthetic).
- The location of the tree and the number and monetary value of potential targets (people and cars per day, or the value of assets under threat).
- The size, location and type of the hazard (the size of the part likely to fail and the direction in which it is likely to fail).
- The probability of the failure occurring at all.
- The relative 'costs' and viability of risk reduction or mitigation. Costs are principally monetary or personal injury but we must also consider loss of heritage, habitat and amenity.

Each tree subject to inspection will be assessed on their specific needs and merits but some of the risk mitigation measures that we may adopt include:

- More intensive or internal assessment of the tree such as aerial inspection, or special internal decay testing or static load testing.
- Selective pruning to remove the hazardous part.
- Complete removal of the tree depending upon the circumstances and the significance of the tree.
- Installation of simple signage notifying people of the potential hazard and the conditions that may lead to increased risks (eg. high winds).
- Establishment of an informal or formal exclusion zone around the tree.
- Relocation of picnic, seating or play equipment.
- Closure of roads or parking areas to reduce the number of likely 'targets' in the event of tree failure.
- Artificial bracing, propping or reinforcing of the tree.

All of the above must consider the relative 'costs' and viability of target reduction or risk mitigation. We must also consider the loss of public access, accessibility, inconvenience or potential revenue foregone.

7.3 Tree Asset Monitoring & Assessments

As with any asset, we need to know what we have and where it is located. A key aspect of tree management is to analyse the tree population and use that information to guide management decisions and plan and budget for inevitable tree replacement in a structured and measured way.

We have recently implemented a Contract where most trees within the main activity hubs will be inspected and entered into an Electronic Tree Database. This will allow us to accurately locate, map, identify, and record the details of the Parklands's tree assets. Once completed the makeup of the tree population and their relative distribution in terms of species, age class, condition and significance will be better understood and will provide a baseline of tree information for the Parklands. Once collated, this information will allow the formulation of more proactive and forward focussed tree management strategies.

The above information shall be recorded within an electronic database capable of periodic and constant updating. Appropriate records shall be retained and will document the relative tree risk and conditions over time. Any significant tree work or other actions undertaken to manage individual trees shall also be recorded in this system.

Following the establishment of this baseline data, periodic inspections and reporting to update current tree condition and work requirements will be important to track the ongoing condition and make-up of the tree population.

The tree inspection and risk management protocols shall include the recording of the following information as a minimum:

- Unique identifying asset number of the tree (or group of trees)
- Date of original assessment
- Date of last assessment or inspection
- The botanic name of the tree
- The common name of the tree
- Diameter of trunk (DBH)
- Approximate Height (m)
- Approximate Spread (m)
- The tree condition (moribund, poor, fair, good, excellent)
- The overall form of the tree (suppressed, poor, average, good)
- The age class (young, semi-mature, mature, over-mature, senescent)
- The tree type (deciduous, evergreen, conifer or palm)
- The tree origin (endemic, native, exotic, or weed)
- Any notable defects or issues (decay, lean, previous failures, wounding, inclusions, pest and disease attack)
- Significant tree register status (yes or no)
- Assessed risk rating (broadly acceptable, tolerable, intolerable)
- General Comments or Notes
- Work Record and Date Performed
- GPS co-ordinate position of tree
- Photo of the tree or group of trees

7.4 Minimum Qualifications & Standards

As trees are living assets they can be irreparably injured or impacted by careless or ill-educated work. Work on trees shall only be undertaken by personnel that are appropriately trained and qualified. The following minimum qualifications shall apply for people engaged by the Trust to undertake tree related work.

- AQF Level 3 for all tree pruning, removal and planting work.
- AQF Level 5 for technical assessments and risk analysis with subsequent current qualifications in either QTRA or TRAQ.
- AQF Level 5 for all tree impact assessments and reports.

The following standards and guidelines shall also be adopted by the Trust:-

- AS 4970-2009 Protection of Trees on Development Sites.
- AS4373-2007 Pruning of Amenity Trees.
- AS2303-2015 Tree Stock for Landscape Use.
- AS 4454 – 2012 Compost Soil Conditioners and Mulch.
- WorkCover Code of Practice for the Amenity Tree Industry, 1998.
- WorkCover Code of Practice for Work Near Overhead Powerlines 2006.
- Supply and plant high quality young trees grown in accordance with the principles detailed within the NATSPEC “Guide for assessing the quality of and purchasing of landscape trees” by Ross Clark 2003.
- Tree planting shall adhere to the typical details provided within this plan and all new tree installations are to be overseen and supervised by an arborist with a minimum AQF 5 qualification.
- Where tree planting is occurring within any identified Aboriginal significant site, the work shall also be overseen by an appropriately qualified and appointed archaeologist or heritage expert.
- The Trust does not specifically require any other authority approvals for tree removals.

7.5 Pest and Disease Control

Pests and diseases can pose a great risk to the health and longevity of our tree asset. Pest and disease threats are increasing and changing within our urban environments due to climate change, greater global trade and movement of people, and gradual reduction of biosecurity measures.

Pest and disease control in a public Parklands and on a large scale can be challenging, costly, and in many circumstances, not even practical or feasible. Some diseases have no effective treatments. Where feasible, we shall take appropriate preventative and corrective actions to ensure that pest activity and disease outbreak does not pose a significant risk to tree health, condition or impact on the visual quality or enjoyment of the Parklands.

There are several currently known pests and diseases that have affected the trees in the Parklands. As with much of Sydney, these include:

- Australian Honey Fungus (*Armillaria luteobubalina*)
- Plane Anthracnose (*Apiognomonia veneta*)
- Cuban Laurel Thrips (*Gynaikothrips ficorum*)
- Eucalypt / Grey Box Psyllid (*Cardiaspina sp.*)
- Fig Psyllid (*Mycopsylla fic*)
- Figleaf Beetle (*Poneridia australis*)
- Fusarium Wilt (*Fusarium oxysporum*)
- Painted Apple Moth (*Teia anartoides*)
- Pink Wax Scale (*Ceroplastes rubens*)
- White Rots (*Phellinus sp.*)
- Phytophthora dieback (*Phytophthora cinnamomi*)
- Sycamore Lace Bug (*Corythucha ciliata*)
- Winter Bronzing Bug (*Thaumastocoris sp.*)
- Myrtle Rust (*Uredo rangeli*)

These diseases can have a devastating effect on tree populations. Overseas examples, such as Dutch Elm Disease and Emerald Ash Borer, illustrate how quickly entire tree populations can be all but wiped out. Analysis and ongoing monitoring of any major pests and diseases is a critical part of our tree management. The ways we will deal with pests and diseases include:

- Monitoring for pests and diseases on a continuous basis as part of the regular Parklands tree inspections, our proactive maintenance program and any reactive tree maintenance works. Regular monitoring and timely intervention is critical to limiting impacts on the population. Treatments for pest and disease, if available, cost effective and safe to perform, shall be performed at the earliest opportunity after identification. The timing of treatment may be dependent on the nature of the pest, as some treatments will be best performed at certain stages of the pests lifecycle.
- Maintaining existing trees and selecting new trees to create a diverse range of species thereby managing the inherent risk from pest and disease outbreak. The more diversification, the less risk of major tree and canopy cover loss from a major pest or disease event.
- Maintaining appropriate and healthy trees. Maintaining existing trees in as healthy state as possible and ensuring any new plantings are installed with best practice methods help provide a resilient tree population. A trees ability to cope with a pest or disease depends in large part on the environment in which it is growing. Some of our trees are growing in very tough environments. Coping with compacted soils, shade, wind, pollution, limited water, constricted root system and over pruning often makes it more difficult for trees to deal with pests and disease outbreaks.
- Reviewing any unexplained tree deaths. Typically we will submit suitable tissue and soil samples for analysis to an appropriate plant pathology laboratory so that we can record and understand the reason behind tree decline.
- Implementing appropriate hygiene protocols such as

cleaning and sterilising of tools (cutting and digging tools) when moving from one tree to the next, and limiting opportunities for cross contamination via cuttings or soil movement between different areas of the Parklands, particularly if pest or disease has previously been recorded in that portion of the Parklands.

7.6 Tree Pruning

Pruning should not be seen as an essential, normal or necessary tree activity for most trees and will generally not be required except for specific and identified reasons. Pruning has a direct impact on tree health, structure and viability. All pruning of live tissue results in a wound to the tree, which the tree will attempt to seal and compartmentalise. Incorrect pruning techniques can lead to decay and disease within the tree.

Pruning of the canopy also has the consequence of removing valuable foliage, which in-turn removes an essential source of energy production from the tree. The tree will then spend considerable reserves of energy on trying to regrow the lost foliage. Branches and trunks are also important transport and storage tissues within the tree.

Increasing research also illustrates the importance of natural tree branching structure and the ability of the tree to deal with strong winds. The mass damping effect of multiple branches moving in multiple directions during storms helps protect trees and reduce the destructive energy acting on the tree. Excessive removal of branches can reduce this mass damping effect and may contribute to increased failure rates.

Most trees should not typically require pruning on any regular basis. Should pruning work be required it shall only be undertaken by suitably qualified personnel using sharp and clean tools. Where there is a risk of the spread of disease from one tree to another, the pruning tools shall be disinfected between trees.

The types of pruning that may need to be undertaken include the following:

- **Deadwooding:** This is the removal of dead or dying branches. If dead wooding is proposed then our Contractors shall remove all dead branches greater than 50mm in diameter on young trees less than 5m in height. They will remove all dead branches of greater than 75mm diameter for existing mature trees greater than 5 metres in height, but only where practical or as advised by the Trust. Trees in remote or naturalistic environments shall typically not require deadwooding. If undertaken in natural areas, on suitable sized trees, opportunities for habitat feature creation may be considered where practicable to create spouts, hollows and microbat-hollows.
- **Crown raising:** This will involve the removal of selected lower branches as required to create adequate building, vehicular or pedestrian clearances. These shall be as per the table below (measured at 1 metre radius from the centre of the main trunk outward).
- **Selective Pruning:** This will involve the removal of selected branches and only as required to remove an identified hazard, defective or otherwise abnormal branch. Pruning of branches larger than 150mm in size should be reviewed by a suitably qualified AQF5 consulting arborist.
- **Formative pruning:** This is normally small scale and relatively minor pruning undertaken on young trees to improve their long term health and structure. The aims of formative pruning are:
 - a) to enhance form and improve structure, or to directionally shape young trees;
 - b) to reduce the development of any structural weaknesses;
 - c) as a precursor to more specialized pruning; and
 - d) to accommodate site constraints and reduce encroachment on utilities or buildings as the tree grows. eg: clearance to lights, signs, poles, wires and buildings.

Table 6 - Standard Clearances and Pruning Guidelines

Item	Clearances Required
Roads	2.5 metre height clearance over parking spaces, 4.5 metres over main vehicle travel lanes
Bus lanes and stops	4.5 metre height clearance over dedicated bus lanes and bus stops
Pedestrian paths	2.5 metre height clearance or where site lines are required to pedestrian crossings
Buildings/structures	1 metre all round clearance
Local electrical service wires	0.5 metre all round clearance
Road Signs/Traffic signals	As required to provide adequate sight lines in normal travel direction
Lighting	As required to provide adequate illumination
CCTV	As required to provide adequate visual access to critical areas
Main electrical powerlines	As required or directed by relevant energy authority and the voltage of the cables.

7.7 Tree Bases and Surround Management

The area around a tree is vitally important. It is where the unseen but all important roots reside. The quality of the soil conditions around the tree often has a direct impact on the health of the tree and its resilience. We will maintain the area around existing trees to promote tree health and ongoing protection.

Trees located within grassed areas shall have a clearly defined mulched area under the tree to a minimum of 2-3 metre radius. This shall be a suitable recycled hardwood and coarsely chipped mulch. This helps prevent otherwise avoidable impacts to the trunk and root flare from mower and line trimmer damage. It is important the mulch is not too deep and is of a free draining nature. Excessively thick mulches or very fine organic mulches can become hydrophobic and actually prevent water from reaching the soil zone or introduce unwanted pathogens to the soil or tree.

A mulch ring around trees is a very simple and vital way of maintaining soil quality around the trees and promoting moisture retention, reducing and reversing soil compaction, decreasing soil temperature fluctuations, and increasing nutrients and general microbial activity.

We will typically

- a) ensure that tree bases are relatively weed free and that grass re-growth is controlled
- b) the mulch is level in appearance and regular in shape;
- c) ensure that herbicides are not used to treat to edges of the tree bases;
- d) that mulch around tree bases is maintained between 75-100 mm thick at all times and that mulch is no higher than 50mm when against the trunk.

Given the size of the Parklands and numbers of trees, it is not considered practical to provide any wide spread application of fertilisers or the like. Similarly, many of the trees are native and are well adapted to surviving in the current soil conditions. Major soil chemistry abnormalities are not observed or expected. Where we need to manage an important or significant tree we shall typically take a representative soil sample and have it tested by a reputable testing laboratory for nutrient or other chemical imbalances. Where practical, we shall then implement the recommendations to improve the horticultural qualities of the soil through appropriate application of ameliorants immediately around the required tree(s).

For trees that may be showing signs of acute stress or nutrient deficiency the following guidance is provided.

Fertiliser shall typically be a quality and controlled release fertiliser applied at the recommended dosages. This will typically be less than 50 grams/m². The use of soil wetting agents such as 'Wettasoil™', 'Saturate™', 'Chemwet™' or other approved alternatives may also be used in accordance with manufacturer's recommendations. This can be important to improve the water penetrating capacity of any hydrophobic or compacted soils.

For particularly stressed or injured trees the use of growth stimulants such as 'Auxinone™' by Barmac Industries at a rate of 10ml Auxinone™ mixed with 10 litres of water together with a soil wetting agent to the area around the tree root surfaces may be applied to trees in accordance with manufacturer's recommendations.



Figure 7.3 - Mulching of tree bases is a simple but critical way of maintaining tree health by reducing competition with grasses for water and nutrients, maintaining soil temperatures and moisture, inhibiting weeds and preventing mower and whipper-snipper damage. It also is vital tool in helping to prevent compaction of the soil around the all important root zone.

7.8 Tree Removals

Virtually all trees within actively used areas will at some stage require removal. This is an important aspect of the Parklands tree management. As outlined, not all trees are the same. The Parklands has inherited trees from a variety of periods, including pre-existing remnant trees, and various tree planting and beautification programs throughout the last several decades. Not all trees have been planted or sourced appropriately. Changes in the Parklands structure and uses may also lead to trees now being located in undesirable positions. All of this may contribute to the need for tree removal.

As part of the tree removal process we will particularly consider the significance of the tree being removed. Trees with known heritage significance shall typically have a succession plan prepared prior to their removal such that the tree is replaced like for like and relevant stakeholders are consulted and informed prior to its removal.

Removal of such trees shall typically be a last resort following exploration of other options (such as crown reduction, bracing or propping). Propagation from the original tree(s) shall commence as a priority to try and maintain the genetic and historical link with the original trees. This shall be done with suitable lead times so that appropriate replacement stock is available and ready for planting when circumstances for removal dictate. This may not be applicable to trees that have known genetic problems or when the species may be replaced by a different species with similar character, due to the original tree being unsuitable due to invasiveness, known failure problems and inherent unsuitability to the site or location.

For naturally endemic tree species, replacement stock shall be propagated from locally sourced seed wherever possible or from other appropriate seed stock of known provenance.



Figure 7.4 - At some point, all trees will reach the end of their useful life and require removal.

In some cases trees to be removed shall not be replaced. This will be due to:

- Opening up identified historic view and vistas
- Inappropriateness of the tree planting due to the current site constraints, infrastructure, clearances or sight lines.

We will use the following criteria as a guide for the approval of tree removals:

- (a) severe decay in the trunk or major limbs with potential for failure;
- (b) evidence of root plate movement, severed structural roots, or repeated and progressive root plate failures;
- (c) dead trees;
- (d) trees in severe decline and likely to die within next 1-5 years;
- (e) large included branches or trunks with high potential for failure;
- (f) severe and systemic canker, pest or disease attack;
- (g) any unusual, uncommon, or unknown incidence of pest or disease;
- (h) severe storm or mechanical damage with high potential for further whole or part tree failure;
- (i) any other tree with structural defects causing a high potential for whole or part failure;
- (j) undesirable weed species less than 10m in height;
- (k) small or medium sized trees with very poor form that are unable to be corrected through formative pruning;
- (l) damage to any small or medium sized tree that will prevent its ultimate proper growth and development;
- (m) trees growing in inappropriate locations or too close to paths, roads or more significant heritage trees; and
- (n) trees severely suppressed by adjacent trees and of poor health and form.

We require anyone removing a tree to obtain prior approval in writing from the Trust prior to the removal (except in the case of an emergencies). Typically trees will be felled to ground level and the stumps ground out. Tree removals shall typically follow the procedures and specifications outlined in the Parklands – 'Landscape And Facilities Maintenance Contract - Western Sydney Parklands - Volume 6 - Technical Specification'.

For any tree removal works, where trunks or branches have cavities or spouts, that may have potential impact on native wildlife, a suitably trained wildlife handler (WIRES or approved equivalent), must be engaged to try and relocate any animals prior to works or to be on-site to assist with the handling or relocating the animals during the works. No works will commence on the trees identified until this action has been undertaken. In the event that wildlife is encountered during the course of tree pruning or removal, works shall only proceed where there is no risk of harming the animal.

In the event that wildlife is encountered during the course of tree removal works, and the tree was not previously assessed as having potential wildlife impacts, work will be temporarily stopped until a trained wildlife handler attends the site or the animal safely relocates itself.

7.9 Emergency Removals, Storm Damage, Accidental Damage and Other Special Needs

Emergencies and Storm Damage

Proactive tree management and maintenance will normally reduce the level of reactive tree maintenance activities or unusual tree management needs. However dealing with urban trees and trees that are a legacy from previous periods will always result in unexpected and ad-hoc maintenance requirements. Similarly, unusual or extreme weather events can lead to unexpected tree issues and storm damage.

Very occasionally, the immediate removal or pruning of a tree(s) may be required due to imminent danger to life or property. In the event of an emergency situation approval will not be required from the Trust. In the event of major property damage or a tree causing personal injury or death we will expect the relevant emergency services personnel and the tree Contractors engaged to deal with the incident to take photographic evidence of the tree failure and any damages sustained to property. They should report the failure as soon as practical to the Trusts representative.

After extreme storm and weather events we shall implement a rudimentary windshield or walk by inspection, within 48-72 hours of the event. This inspection shall be throughout the main activity hubs of the Parklands in an attempt to quickly identify failed trees or any imminent threats, such as broken or cracked trees, partial branch failures, partial root plate failures, hanging branches etc. The main focus of this inspection shall be the main roadways and pedestrian thoroughfares. Peripheral areas or seldom visited areas shall be picked up as part of the normally implemented and progressive tree inspections.

Tree failures or storm damage clean-up will be dealt with in a timely fashion by the Parklands contracted maintenance program providers.

Should a tree be accidentally damaged, timing can be of the essence, particularly with bark injuries, trunk damage or chemical contaminations.

Where a branch has been broken, it shall be removed and the damaged end pruned to a suitable branch collar in line with normal pruning practice. If the branch has been torn out of the trunk, assessment shall be made and the damage cleaned as much as practicable, without sustaining further damage to the tree.

If bark has been dislodged from the trunk or large branches, it may be possible to reinstate it to the tree using suitable non-injurious strapping and wrapped with moist hessian and/or industrial cling film to tightly reattached the damaged bark or “phellem”. This process is time critical and must be done within hours of the damage. This will limit water loss and allow the tree to potentially develop the formation of a “traumatic phellogen” that may resume its function as a producer of the protective cork or bark layer. The covering should be removed after approximately 4 weeks and checked. At this time any dead or unviable material should then be carefully removed and the damage re-assessed.

If roots are accidentally disturbed or excavated, any broken and torn sections shall be exposed and pruned leaving clean cuts to minimise risk of infection by fungal pathogens and promote good conditions for new root growth. Damaged trees should receive more care and potentially be watered and fertilised to help sustain tree health and growth.

Live Stag Creation

Some of the existing larger native trees located within the Parklands may be identified as important habitat trees with a variety of hollows and spouts. If these decline or die, where viable and appropriate, they may be pruned to form “live stags”, thereby preserving as many existing hollows as possible and retaining most of their habitat value. This may substantially reduce the likelihood of tree and branch failures in the short to medium term. A suitable fauna ecologist shall be present during the live stag creation in case a removed or retained hollow has any fauna present and requires appropriate relocation.

To create a live stag we shall:-

- Assess the overall form, lean and balance of the proposed live stag tree and remove any excessively leaning or outreaching branches;
- Remove any severely decayed or hollowed material that may be likely to fail within the foreseeable future;
- Typically remove all branches and dead wood below 150mm in diameter, and in accordance with normal pruning practice;
- Retain as many existing hollows, spouts and cavities without further treatment or pruning.
- Inspect for and arrange for any active termites to be treated if they are still active and present within the tree.

Artificial Bracing and Propping of Trees

Interventions such as bracing or propping will not normally be implemented due to the large costs and potentially short-term efficacy. It will only be considered as a last resort to avoid complete removal of a very important tree. This type of tree management will only be implemented for the very highest value habitat or heritage trees.

If it is needed, it shall be designed and installed by experts in the field of tree bracing and support. It will then be monitored on an annual basis. Rigging and other fixtures shall be inspected and replaced when worn or damaged, as necessary.

Root Barriers

Root barriers are not recommended and will typically not be required. Their installation around existing mature tree can have a significant and detrimental impact to the trees roots. They shall only be installed when specifically warranted and needed to protect a significant piece of infrastructure or an important heritage structure.

Their installation will be required to be independently assessed by a qualified Arborist, prior to its installation, to ensure that its use does not detrimentally impact the roots of an existing tree, impact on important heritage items, and it will actually provide the protection from roots that is intended.

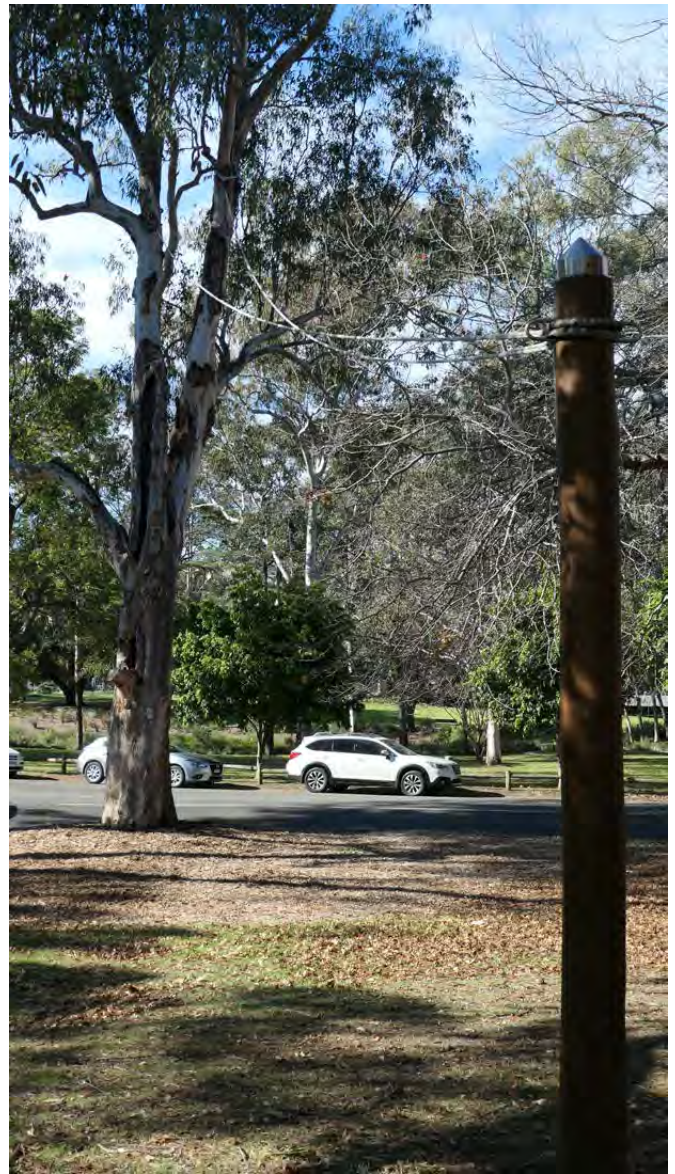


Figure 7.5 - An example of specialised bracing and failure arrest systems employed to extend the useful life of a significant tree and minimise tree related risk to acceptable levels. These are typically an expensive and last resort approach and must be designed and installed by experts.

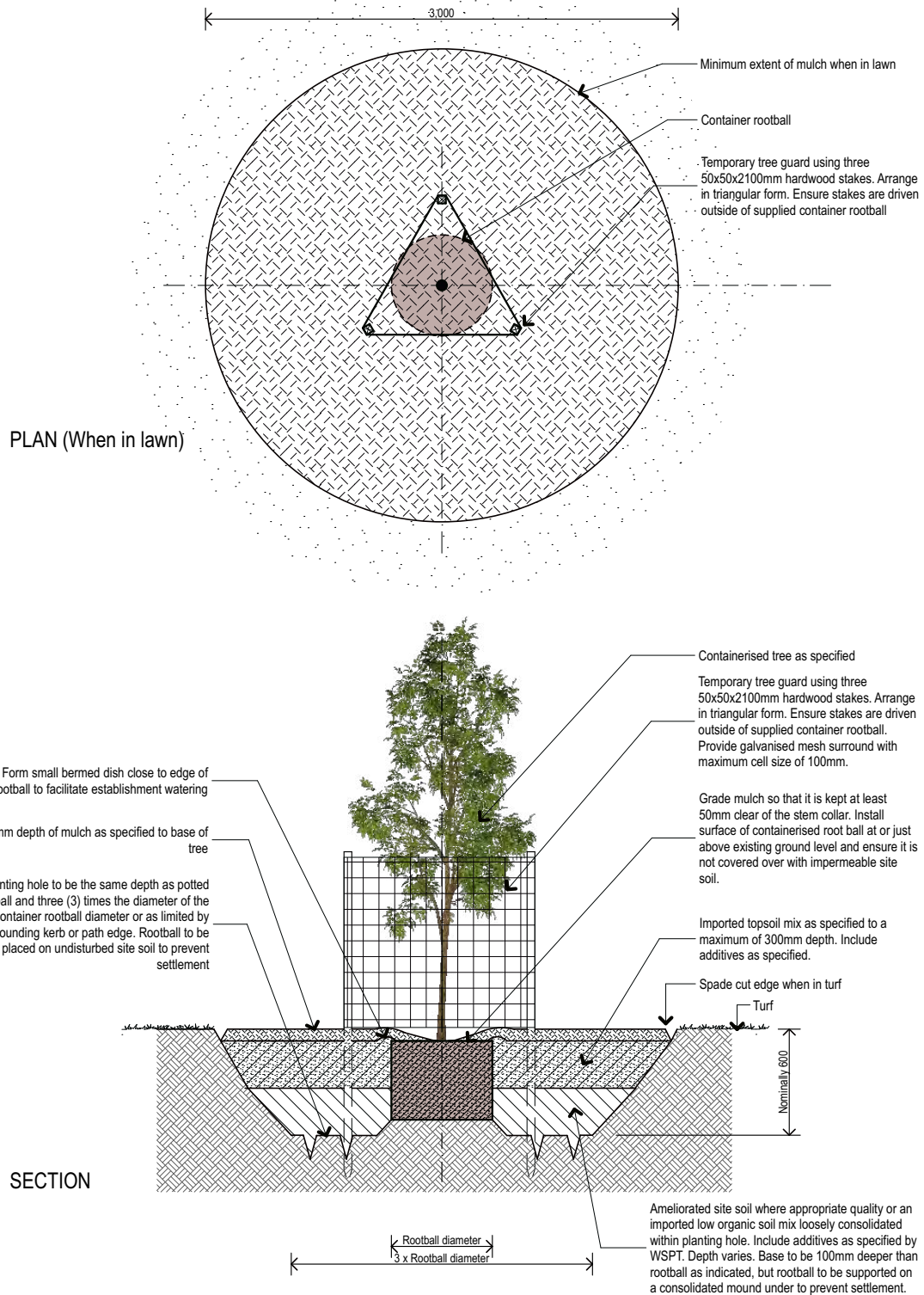


Appendices

8.1 Standard Tree Planting Detail

NOTE 1:

All details are to be read in conjunction with any site specific conditions or issued Contract Documentation by WSPT.



8.2 Event Planning & Tree Protection Information Sheet

Overview:

Trees are an important component of the Parklands. It is the responsibility of the event organiser to protect the Parklands's trees in the course of planning and holding an event.

Trees are easily damaged particularly during bump-in and bump-out due to:

- Vehicle or equipment impact or
- Soil compaction within the root zone.

Trees are easily damaged during the event by event staff, contractors or patrons:

- Inappropriately attaching things to trees,
- Vehicle or equipment impacts,
- Breaking branches, trunks and foliage,
- Spilling or dumping chemicals,
- Compacting soil within the root zone.

Trees may also present risks to patrons in the event of extreme weather conditions such as storms or high winds.

To ensure the best outcome for your event and the ongoing health of our trees please consider the following points.

Prior to your event:

Prepare and submit to the Trust an event Plan including a site plan showing:

- Proposed equipment layout, vehicular and pedestrian access routes and provision for appropriate offsets for safe clearance to trees
- Proposed bump-in / bump-out routes to avoid trafficking in close proximity to trees
- Locations for heavy items such as generators and cool rooms well clear of trees
- Major pedestrian and vehicular routes to avoid trees
- Tree and ground protection as required by the Trust

During your event:

- Install tree and ground protection as per the approved event site plan.
- All contractors and event staff shall be briefed on the importance of tree protection.
- Bump-in / bump-out routes shall avoid trafficking under or in close proximity to trees.
- Ensure a Trust representative acts as a 'spotter' to observe and direct all heavy vehicle movement and equipment installation in the vicinity of trees .
- Alternative access shall be implemented if the truck cannot safely fit under tree branches. No tree branches are to be pruned or snapped off.
- Do not affix anything to trees.
- No branches or foliage shall be damaged or removed to facilitate equipment installations.
- Heavy equipment shall be installed per the approved event plan on appropriate ground protection.
- Ensure generators are located at least 10m from trees and exhaust emits away from trees and foliage.
- Bulk fuel stores shall be kept a minimum of 15 metres away from any tree.
- Refuelling shall be done a minimum of 10 metres from any tree. Appropriate bunding and ground protection is required during all refuelling operations regardless of distance to trees.
- A 'fuel spill management kit' shall be on hand at the location of any refuelling activities.
- Any refuelling shall be carried out by a team of two people.
- Event security is to ensure patrons do not climb or damage trees.
- In the event of extreme weather conditions such as storms or high winds the event shall be suspended and the site evacuated in accordance with the Emergency Management Plan.

The Trust may impose monetary bonds and or penalties for event related damages to trees, grounds and Trust assets as per the event deed of agreement.

8.3 References & Relevant Links

IMPORTANT DOCUMENT LINKS

NSW Government - Western Sydney Parklands Act 2006 No. 92

<https://www.legislation.nsw.gov.au/#/view/act/2006/92>

NSW Government - Western Sydney Parklands Regulations 2019

<https://www.legislation.nsw.gov.au/#/view/regulation/2019/412>

NSW Department of Planning and Infrastructure - State Environmental Planning Policy (Western Sydney Parklands) 2009

<https://www.legislation.nsw.gov.au/#/view/EPI/2009/91>

Western Sydney Parklands, 2013, Biodiversity Strategy 2012-2020, Western Sydney Parklands Trust, Sydney

<https://www.westernsydneparklands.com.au/things-to-do/environment/form-for-biodiversity-strategy/>

Western Sydney Parklands, 2018, Plan of Management 2030, Western Sydney Parklands Trust, Sydney

<https://www.westernsydneparklands.com.au/about-us/planning-the-parklands/>

Western Sydney Parklands, 2018, Design Manual, Western Sydney Parklands Trust, Sydney

<https://www.westernsydneparklands.com.au/about-us/planning-the-parklands/>

Western Sydney Parklands, 2018, Southern Parklands Framework, Western Sydney Parklands Trust, Sydney

<https://www.westernsydneparklands.com.au/assets/Southern-Parklands-Framework.PDF>

Australian Government - Environmental Protection Biodiversity Conservation Act 1999

<http://www.environment.gov.au/epbc/about>

NSW Government - Heritage Act 1977

<https://www.legislation.nsw.gov.au/#/view/act/1977/136>

NSW Department of Planning and Infrastructure - State Environmental Planning Policy (Infrastructure) 2007

<https://www.legislation.nsw.gov.au/#/view/EPI/2007/641/part3/div12>

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- NSW Government - Western Sydney Parklands Act 2006 No. 92
- NSW Government - Western Sydney Parklands Regulations 2019
- NSW Department of Planning and Infrastructure - State Environmental Planning Policy (Western Sydney Parklands) 2009
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- Western Sydney Parklands, 2012, *Biodiversity Strategy 2012-2020*, Western Sydney Parklands Trust, Sydney
- Western Sydney Parklands, 2018, *Plan of Management 2030*, Western Sydney Parklands Trust, Sydney
- Western Sydney Parklands, 2018, *Southern Parklands Framework*, Western Sydney Parklands Trust, Sydney
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- Western Sydney Parklands, 2018, *Design Manual (version 2)*, Western Sydney Parklands Trust, Sydney
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