

**City of
Wanneroo**

Street Tree Master Plan

Version 2 - September 2005



Version No.	Detail	List of Revisions	Date	Authorised by
Version 1 - Aug'04	As Presented by Arbor Vitae and approved by Council		10 August 2004	Council
Version 2 - Sept'05	Full Internal Review - As adopted at City of Wanneroo Council Meeting held on 20 September 2005	<ul style="list-style-type: none"> • Addition of List of Common Names (Appendix C) • Addition of the following tree species: <ol style="list-style-type: none"> 1. Brachychiton gregorii 2. Callistemon "Kings Park Special" 3. Eucalyptus melliodora 4. Eucalyptus "torwood" 5. Liquidambar styraciflua 6. Melaleuca ericifolia 7. Prunus x blireana 8. Pyrus calleryana Includes revisions to Landscape Character Unit Tree Lists and Appendix D (formerly Appendix C) Plant Information Fact Sheets. • Modifications to Plant Information Fact Sheets including additional photos, more information on longevity, and amendments to the following: Olea europea (more information), correction of all "Headings" formerly spelt "Habitat" to "Habit" and spelling correction to Araucaria heterophylla. • Reference to "City of Wanneroo Recommended Climber Groundcover and Shrub Species list in Executive Summary and Appendix E. • Modification to Figure 26 – More Fire Resistant native trees. 	September 2005/August 2006	Council/Rob K

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Executive Summary

The City of Wanneroo is seeking to strengthen its street tree amenity, and chart a strategy for future planting that is sympathetic to new and existing developments as well as areas of cultural and environmental significance. This has inspired the development of a Street Tree Master Plan that will enhance existing and future streetscapes. The Street Tree Master Plan comprises five key objectives:

- To facilitate the visual and environmental enhancement of streetscapes throughout the City;
- To identify, reinforce or establish a recognisable landscape character in terms of the streetscape;
- To increase the legibility of the City's layout;
- To assist in the planning process with respect to promoting the visual integration of individual subdivision (estate) developments into landscape character units that are likely to be more representative of the ultimate community aspirations;
- To provide a large variety of choice of suitable street trees to add interest and character to the City's various streetscapes.
- To increase the number of suitable street trees within the City of Wanneroo;
- To demonstrate the application of the City's preference for the right tree in the right location.

The study identified four landscape character units within the City of Wanneroo - the Coastal Landscape, the Dunes Landscape, the Lakes Landscape and the Eastern Plain Landscape. A list of suitable street tree species has been prepared for each zone. The tree species selection is based on suitability to the environmental constraints and enhancement of the landscape character of each zone, and suitability to perform as a street tree. The Street Tree Species List is accompanied by a checklist to guide the City of Wanneroo, designers and developers in suitable street tree selection.

The Street Tree Master Plan will be used as a basis in the formulation of policies relating to the planning, management, and enhancement of streetscape amenity within the City of Wanneroo. The City's *Recommended Climber, Groundcover and Shrub Species List* may be used in conjunction with the Street Tree Master Plan to assist in further enhancement of the streetscape (refer Appendix E).

1.0 Introduction

The Street Tree Master Plan provides a strategic framework for the City of Wanneroo, designers and developers to assist in the appropriate selection of street trees for existing and future streetscapes.

The Street Tree Master Plan has been divided into six key areas:

Landscape Character Analysis

- The City of Wanneroo in context
- Cultural landscape elements
- Biophysical landscape elements
- Existing street trees in the City of Wanneroo

Transport Network Analysis

- Elements of a Streetscape.
- Existing Streetscapes
- Future streetscapes

Design Parameters

- Types of street trees
- Specific tree uses
- Management of street trees

Landscape Character Units for Street Tree Planting

Primary Distributors

List of Recommended Street Tree Species

1.1 Requirements of Trees, the Public and the City of Wanneroo

For trees to function in streetscapes as well as enjoy a long, healthy lifespan the requirements of the trees, the public and the Council must be taken into account by all professionals that design streetscapes or planting in the City of Wanneroo.

Trees

Trees have a number of basic requirements in order to survive and live a healthy life. Trees suited to the environmental conditions in which they are planted, both biophysically and culturally, have a greater chance of survival and health. To survive trees need to have light, water, air, soil and nutrients and sufficient space for their roots and limbs to grow.

The Public

The public should expect street trees to provide a valuable contribution to the streetscape and the public domain. The public can expect the City of Wanneroo to make appropriate selections of street trees and undertake regular monitoring and maintenance integral to ensure the success of the Street Tree Master Plan. The use of street trees also assists in increasing the legibility of the street network within the City. Legibility enables people to form a clear, accurate image of a place and aid in orientation.

The public expects a large variety of trees to be planted throughout the City including both evergreen and deciduous trees. Where existing streetscapes are in place, new trees planted to replace those that have died match the others in the street. Tree requests are assessed by the City of Wanneroo to ensure that the tree is in keeping with the existing streetscape and will meet criteria for suitable street tree. New streetscapes are developed and implemented after consultation with residents. Potential trees may be selected from a palette of varieties suitable for the area.

Trees

- light
- water
- air
- nutrients
- space

The Public

- visual interest
- physical comfort
- sense of well being
- safety

The Council

- realistic maintenance requirements
- assurance of public safety in relation to the effects of street tree growth
- environment
- identity

The City

The City of Wanneroo recognises that street trees contribute to urban water management, biodiversity, air pollution and the environmental amenity within the City. The City is also aware that street trees assist in forming the identity of the region and, at a local scale, the neighbourhood character. While appreciating the importance of this resource, the City is conscious of the problems associated with managing and maintaining trees within the urban environment. To achieve these outcomes effectively the City needs to guide the design and planning process of streetscapes and develop a strategy for their maintenance and management.

1.2 Project Methodology

The methodology for preparing the Street Tree Master Plan was developed to achieve a practical and logical strategy. The methodology incorporates five stages:

Site Analysis

The development of the Street Tree Master plan involved a site analysis of the City of Wanneroo. A Fieldwork Survey of all the primary and secondary streets within the 36 localities in the City of Wanneroo was undertaken. The survey included identification of the dominant trees and character of the area. The site analysis included collation and synthesis of documents regarding the biophysical and cultural components of the City. The synthesis of this information led to the definition of the Landscape Character Units in the City of Wanneroo specifically related to the planting of street trees.

Research

An integral part of the development of the Street Tree Master Plan was a review of documents, prepared by stakeholders including Department of Planning and Infrastructure, FESA, Main Roads WA, and utility

providers, and consultation with professionals which have a major bearing on the design of streetscapes and the selection of street trees.

Review of the information gathered led to the formulation of the Landscape Character Units and their corresponding Street Tree Species Lists.

Stakeholder Consultation

The Street Tree Master Plan has been prepared in consultation with the Street Tree Master Plan Reference Group. The reference group comprises representatives from the following organisations:

- City of Wanneroo – Directorate of Technical Services
- City of Wanneroo Environmental Advisory Committee
- Urban Development Institute Australia (UDIA) – WA Branch
- Public utilities providers (primarily Western Power)
- Main Roads WA

Draft Street Tree Master Plan

The outcome of the site analysis, desktop review and the stakeholder consultation was used to develop a Draft Street Tree Master Plan. The plan determines an overall strategy and design approach. It also incorporates a list of appropriate street trees species. The Draft Street Tree Master Plan will be made available to the public for review and comment.

Final Street Tree Master Plan

The Final Street Tree Master Plan incorporates comments made by the public during the public comment period. The Final Street Tree List is developed into a comprehensive and illustrated document. The Final Street Tree Master Plan will be presented to the Council for endorsement and will help formulate any future street tree policies.

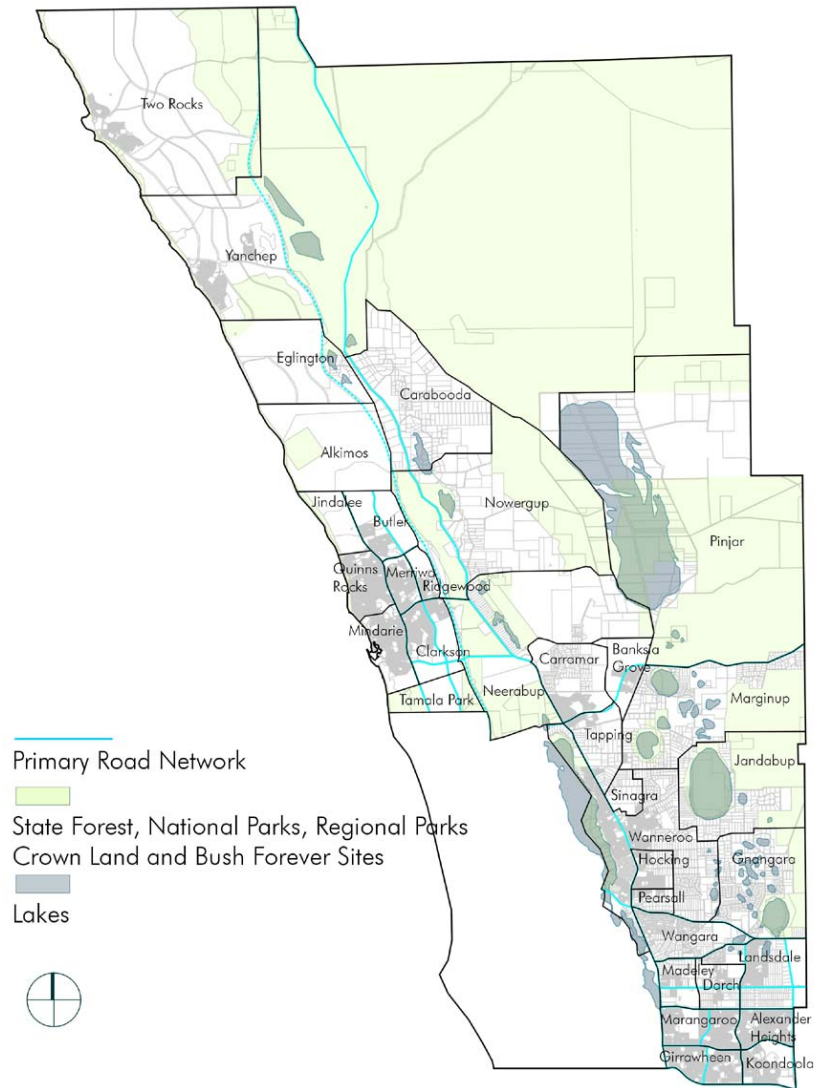


Figure 1 Localities within the City of Wanneroo

2.0 Landscape Character Analysis in the City of Wanneroo

The landscape character analysis outlines the interrelated cultural and biophysical factors associated to street tree planting in the City of Wanneroo. The cultural and biophysical factors are combined to create the landscape character units of the City of Wanneroo. The landscape character units relate specifically to the selection of street trees and are described in Section 5 of the report. The landscape character analysis is used to indicate the current conditions in the City of Wanneroo and create a context through which subsequent planting decisions can be made.

The landscape character analysis was undertaken through fieldwork in the City of Wanneroo including a detailed survey of the primary transport network. This fieldwork has identified the extent and condition of existing planting and an understanding of the City's street tree requirements. The fieldwork has been supplemented by extensive research of planning and environmental data to anticipate land use changes and guide the responsible selection of street trees.

The cultural component of the character analysis outlines the major human land uses, including places of historical and environmental significance. The biophysical component outlines the elements that combine to produce the environmental conditions in Wanneroo including climate, soil types, topography, hydrology and locally native plant communities.

2.1 The City of Wanneroo in Context

The City of Wanneroo is a busy and vibrant component of the northern Perth Metropolitan area that displays a diversity of landscapes and land uses ranging from residential to rural and conservation. The City is comprised of 36 localities of varying size and land uses.

The City of Wanneroo is recognised as one of the fastest growth areas

in Australia with its population projected to rise from 83,000 currently to 260,000 by 2030. Most of this development will occur in the northern coastal strip, an area approximately three kilometers wide located between Tamala Park and Two Rocks. It requires major planning and infrastructural works including the extension of the Mitchell Freeway. The existing southern residential localities are also undergoing New Living Urban Renewal through government initiated schemes. In addition to the residential land uses there is the continued importance of agriculture and other industries in the City, mainly located in the eastern and northern areas.

The conservation and enrichment of remnant bushland and ecologically sensitive wetland areas is also an important initiative for the City. National parks, regional reserves, 'Bush Forever' sites, State Forest and Crown Land form 33% of land within the City.

2.2 Landscape Enhancement Area

The City of Wanneroo has identified four areas, the Circular Lakes, the Linear Lakes, the Coast and Reef Landscape Enhancement Areas, as areas in which the environment is important and sensitive enough to warrant special consideration. City of Wanneroo Policy 4.3.11 Landscape Enhancement Areas, states that *“any development within these area shall enhance and not degrade the environment of the area and will be in accord with, and not contrary to, the nature of the environment of the area.”*

2.3 Existing Street Trees in the City of Wanneroo

A detailed appraisal of the street trees and streetscapes in the 36 localities of the City of Wanneroo was undertaken to determine if any strong planting themes existed on which the street tree master plan could be structured. The survey determined four distinct areas of street tree planting relating to the urban development of the City. Each area reflects the planting trends prevalent at the time of construction. There is a lack of continuity in the street tree planting between the areas and

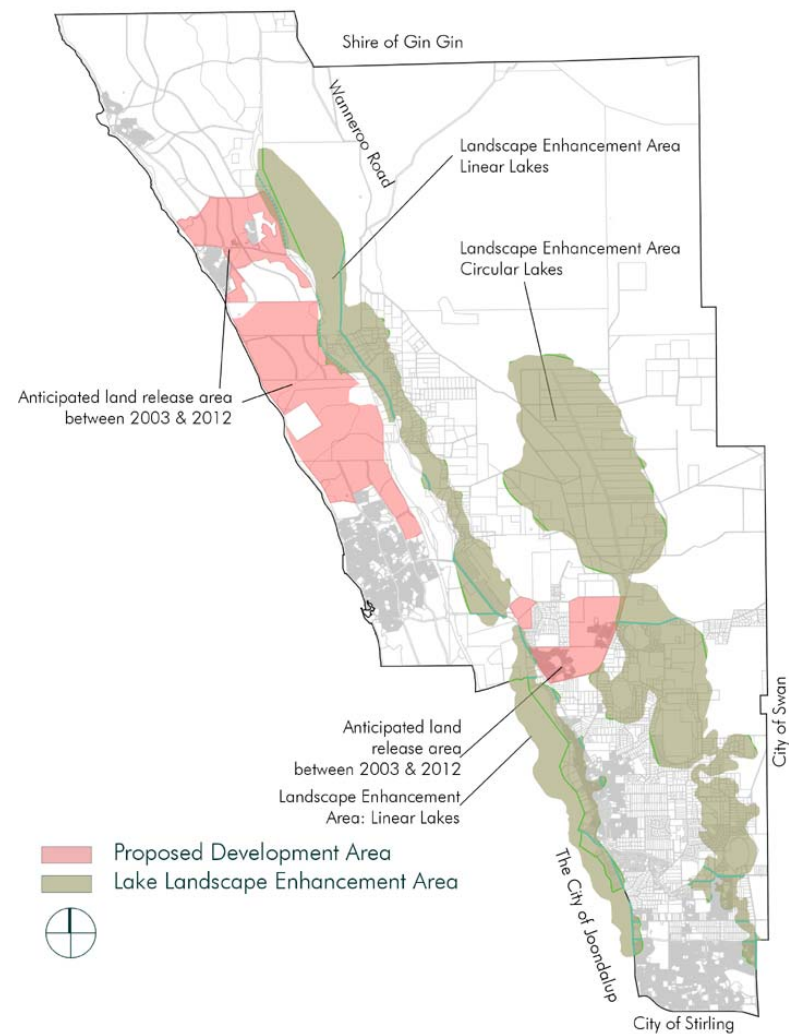


Figure 2 Future Land Use Diagram. This diagram indicates areas where the Street Tree Master Plan will have a significant impact. Adapted from Department for Planning and Infrastructure, Western Australia, 2002



Figure 3 Mixture of mature Australian trees and bush understorey along Alexander Drive, Alexander



Figure 4 *Eucalyptus sideroxylon* 'Rosea' has been recently planted in secondary roads in the southern localities of the City of Wanneroo.

in some cases the planting along a street can change several times dependant upon the time of development and the thematic approach adopted. The distinct areas are:

- Southern localities -suburbs established in the 1970 and 80's.
- Central localities – peripheral residential developments of Joondalup city centre established in the 1990's (and continuing).
- Coastal localities – estate developments, encompassing coastal towns Quinns Rock, Yanchep and Two Rocks, starting in 1990's and continuing.
- Rural and bushland area– located predominately in the northern and eastern part of the City.

Southern Localities

Suburbs in the southern part of the City of Wanneroo were developed in the late 1970's and early 80's. The street tree planting reflects a preference for native trees. These trees have matured to form large majestic street trees, particularly on the primary road network. The primary roads in this area, including Wanneroo Road, Alexander Drive, and Beach Road are characteristically wide, with large randomly planted gums and irregular 'bush' understorey. The secondary road network has recently been replanted with *Eucalyptus sideroxylon* 'rosea'.

Central Localities

The Central Localities includes suburbs that are associated with the development of Joondalup city centre. The street tree planting reflect an increased interest in streetscape design and the influence of thematic design of landscapes in new residential estates. There has been a shift from the extensive Australian species to exotic species. This is largely due to a perceived market preference and the marketability of instant streetscapes with strong landscape themes. The street tree planting is regular and consistent, with a low understorey (usually grass). The predominant species used in this area are

deciduous trees including Fraxinus sp., Liquidambers, Plane Trees and Jacarandas. The deciduous trees form a strong contrast to the woodland of the natural landscape.

Coastal Suburbs

The coastal suburbs reflect a similar focus on the streetscape design as the central suburbs. As with the central suburbs there is an emphasis on regular street tree planting which acts as a contrast to the surrounding natural vegetation. Avenues of tall trees (including Norfolk Island Pines, Cotton palms) are used along both the secondary and primary streets, as a contrast to the generally low vegetation associated with the coast.

Rural Roads

There is a network of rural roads through the northern part of the City. The street trees in the road reserve of the rural network are predominantly remnant vegetation. In areas where street trees have been planted they usually act as a windbreak or a visual screen.

2.3.1 National Parks Bushland, Wetlands & locally native species

Remnant locally native trees often occur in road reserves that pass through National Parks, regional parks, bush forever sites and rural bushland. These trees form part of the surrounding bushland structure and are indicators of the local vegetation association and soil type. In and national parks show

2.3.2 Street Tree Trends

Over recent years there has been increased interest in street trees due to their contribution to the quality of a streetscape. Increased interest has led to a shift from the extensive use of Australian species to deciduous and exotic species.

The City of Wanneroo has cited a number of concerns with this development, in particular the increased maintenance required to



Figure 5 Transplanted mature trees are used to create instant streetscapes. Eg. Corner of Kingsbridge Boulevard and Shelford



Figure 6 Queenscliff Parade, Quinns Rocks, is an example of the extensive use of mature exotic trees (Norfolk Island Pines) that has occurred in the coastal localities.



Figure 7 & 8 Rows of large eucalypts along rural roads such as Pinjar Road, Pinjar and Karoborup Road, Carabooda, form wind breaks and visual screens.



Figure 9 Majestic white trunk eucalypts form a strong avenue effect along Wanneroo Road, Yanchep.



Figure 10 & 11 Cheriton Drive, Carramar (top) and Marchwood Boulevard, Butler are examples of the extensive use of exotic trees in new residential estates. The landscape treatment for both suburbs is very similar and does not express the identity of Wanneroo or the natural environment.

sustain a large number of deciduous trees in environmentally unsuitable conditions and the resulting expense to all ratepayers in the City of Wanneroo. As such a first preference for locally native and Australian trees has been proposed with the requirement that deciduous and exotic street tree planting meet with council approval before being undertaken.

2.3.3 Tree Planting Policy

To date there has been no specific street tree policy in the City of Wanneroo. Tree location has been dictated by landscape guidelines by the City, the requirements of Main Roads WA and public infrastructure providers as well as planting by community groups and ratepayers. There is no coherent theme to street tree planting in the City of Wanneroo and whilst there are many local examples of street trees that could provide a basis for subsequent planting they do not provide a clear structure on which to base the whole street tree strategy.

2.4 Biophysical Analysis

2.4.1 Weather and Climate

The climate of Perth is classified as Mediterranean with cool mild winters and hot dry summers. Sub tropical high-pressure cells that advance south dominate the weather patterns in summer and retreat north in winter. The summer months see the prevailing winds come from the east, with relief to coastal areas provided by the south-westerly sea breezes, and the winter months see prevailing winds come from the west accompanying the cold fronts originating in the lower latitudes.

The Perth area has an average annual rainfall of 800mm of which a majority falls in the four-month winter period between May and August. The summer months are subject to extreme drought, a factor which is intensified by the easterly and south-westerly wind patterns.

The micro climate has a significant impact on the vegetation within the City of Wanneroo. It varies as the topography changes and the distance from the coast increases. Vegetation along the coast is exposed to salt spray and wind. The west facing dunes also tend to be hot and dry from direct heat from the afternoon sun. Where the dunes become more stable, and more protected, taller vegetation appears, particularly in the depressions.

2.4.2 Soil Associations

The City of Wanneroo is located on the Swan Coastal Plain where the geomorphology is dominated by a series of ancient sedimentary dune systems deposited during the sea level fluctuations of ice ages and interglacial periods. There are three major dune systems in the City of Wanneroo with the youngest being the Quindalup dunes located on the coast, the intermediate being the Spearwood dune system characterised by the limestone ridges and the oldest being the Bassendean dune system extending 16 km inland to the beginning of the Darling Scarp. These dune systems form the geomorphology of the Wanneroo area, combining with climate, to dictate the structure of locally native plant communities. Within these three major dune systems there are further sub-groupings for soil types and the related plant communities known as associations.

Quindalup Dune System

The Quindalup dune system is located along the coast, extending at times to 4 Kilometers inland to meet the Cottesloe association ridges. The soil type is white, with a high concentration of lime, 'Aeolian' or wind borne sand that is generally unconsolidated forming the undulating ridges of the primary and secondary dune systems. The Quindalup plant association has very few locally native trees of significant stature due to soil with low fertility and high alkalinity and predominantly exposed windy conditions.

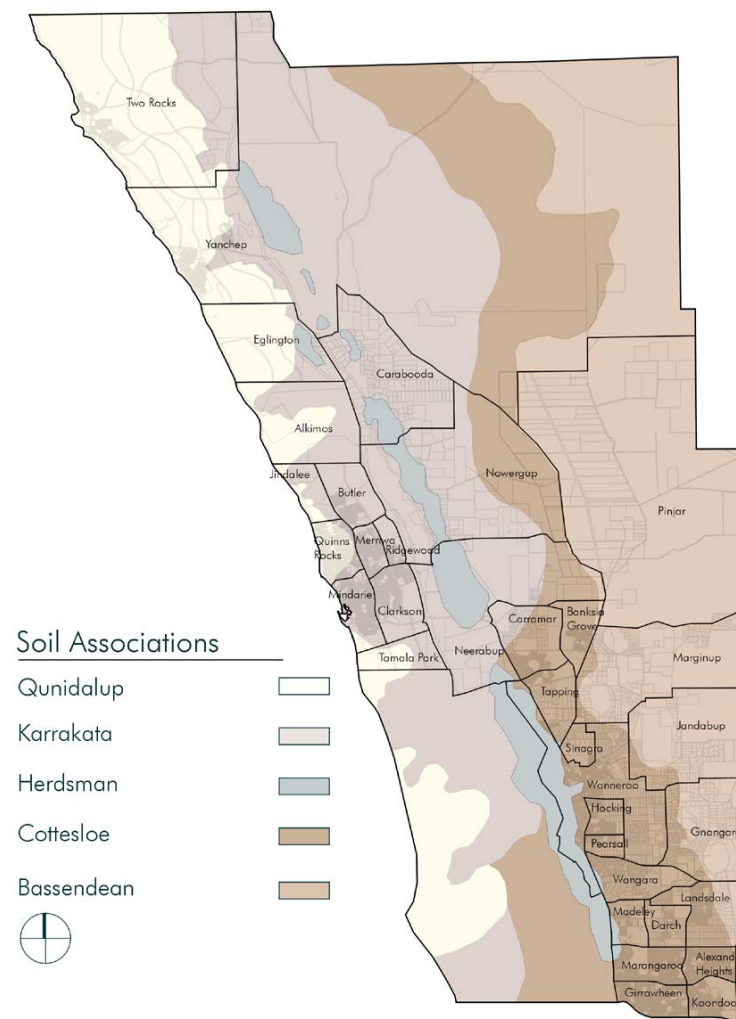


Figure 12 Soil Associations within the City of Wanneroo
Adapted from *Perth Metropolitan Region Land Resource Survey – Rural Area* 23/5/85
1:25 000

Figure 13 Locally Native Tree Species in each Soil Association

Robert Powell & Jane Emberson, *Growing Locals*, Western Australian Naturists Club, WA, 1996, page 82-83.

- Occurs in this type
- Typical of this area

Common Name	Botanical Name	Quindalup	Cottesloe	Cottesloe Ridges	Herdsmen	Karrakatta	Bassendean	Bassendean Swamps
Marri	<i>Eucalyptus calophylla</i>		●		●	○	○	
Tuart	<i>Eucalyptus gomphocephala</i>	○	●		●	○		
Jarra	<i>Eucalyptus marginata</i>		○			●	●	
Flooded gum	<i>Eucalyptus rudis</i>				●			●
Summer-scented wattle	<i>Acacia rostellifera</i>	●	○	○		○		
Peppermint	<i>Agonis flexuosa</i>	○	○					
Common sheoak	<i>Allocasuarina fraseriana</i>		●			●	○	
Candle banksia	<i>Banksia attenuata</i>	○	○			●	●	
Bull banksia	<i>Banksia grandis</i>		○			○	○	
Holly-leaf banksia	<i>Banksia illicifolia</i>				○	○	●	○
Swamp banksia	<i>Banksia littoralis</i>	○			●			○
Firewood banksia	<i>Banksia menziesii</i>		○			●	●	
Saw-tooth banksia	<i>Banksia prionotes</i>					○		
Rottnest cypress	<i>Callitris preissii</i>	●		○				
Limestone marlock	<i>Eucalyptus decipiens</i>		○	●		○		
Pricklybark	<i>Eucalyptus tottiana</i>		○			○	●	
Corkybark	<i>Gyrostemon ramulosus</i>	○	○		○	○		
Saltwater paperbark	<i>Melaleuca cuticularis</i>				○			
Moonah, Rottnest tea-tree	<i>Melaleuca lanceolata</i>	●						
Modong, Stout paperbark	<i>Melaleuca preissiana</i>				●	○	○	●
Freshwater paperbark	<i>Melaleuca raphiophylla</i>	○			●			●
Christmas tree	<i>Nuytsia floribunda</i>		○	○	○	○	●	●
Albizia	<i>Paraserianthes lophantha</i>				○			○
Cheesewood	<i>Pittosporum phyllitaeoides</i>	○	○	○				
Woody pear	<i>Xylomelum occidentale</i>					○	○	

Spearwood Dune System

The Spearwood dune system consists of shallow brown and bright yellow sands over a limestone ridge running north to south, occasionally touching the coastline. The Spearwood dune system consists of a number of different soil associations that contain specific vegetation types; they are the Cottesloe, the Karrakatta and the Herdsman associations.

Cottesloe Association

The Cottesloe association is a series of ridges, hills and hollows that run in a north south Direction whilst extending 5-7 km in width.

They are characterised by shallow brown or bright yellow sand loam over limestone with limestone outcropping occurring in some areas. There is a further distinction between the Cottesloe soils and the Cottesloe ridges as the higher topography of the ridges displays much shallower soils, more limestone outcropping and significantly less trees.

Karrakatta Association

The Karrakatta association consists of deep sand recognised in a 'yellow' and 'grey' phase. The yellow phase has a grey/ brown sandy surface that passes into bright yellow siliceous sand and limestone-often within two metres. The grey phase has a grey sandy surface, a very light grey sub-surface, pale yellow sand beneath and limestone at depth. The Karrakatta soil types typically occur on the eastern side of the Cottesloe ridge and represent the most fertile of the soil associations in the Wanneroo area. The deeper, fertile soils of the Karrakatta zone originally supported the greatest diversity of tree species and are also those most favoured for agricultural practices.

Herdsmen Association

The Herdsman soil type is located around the Linear Lakes and swamps that run in a north south direction including Joondalup, Nowergup, Neerabup and Carabooda Lakes and the swamps of the Yellagonga Regional Park. The soil consists of black peaty sand over

light grey sand with occasional brown mottling. The soil of The Herdsman association (Beondaddy sand) generally occurs within 1 metre of the water table. The Herdsman association has fewer tree species than the Karrakatta and Cottesloe associations that surround it and primarily consists of trees that can handle high water tables and seasonal inundation.

Bassendean Dune System

The Bassendean Dune System runs in a north-south direction and extends eastward to an extent of 16 Kilometers. The Bassendean Dune System is the oldest of three and consists predominantly of heavily leached soils with poor drainage as well as swamp land represented by the Circular Lakes- Lake Pinjar, Mariginiup Lake, Lake Jandabup and Gnangara Lake. They are very infertile as their minerals and plant nutrients have largely been leached out. In the western part of the Bassendean association the areas around the Circular Lakes display a range of wetland and eucalypt woodland species whilst the majority of the association is an undulating topography of successive low hills comprising of highly leached grey sand. Drainage in these sands is poor with moisture passing through higher ground rapidly whilst collecting in lower ground on an impermeable hardpan made from vegetative litter. Vegetation on the grey sands of the Bassendean association is predominantly banksia woodland with a number of eucalypts also present. Mature pine plantation is now also a dominant feature in the Bassendean soil association.

2.4.3 Hydrological Features of the Study Area

The major Hydrological features recognised in the study area are the Linear Lakes including Joondalup, Nowergup, Neerabup and Carabooda that are located in the Herdsman soil association and the Circular Lakes; Gnangara, Pinjar, Marginup and Jandabup that are located in the Bassendean soil association. Both types are surface expressions of the groundwater level, fluctuating seasonally, to create a

number of different permanent lakes, seasonal swamps and waterlogged damplands.

References used for the soil association, plant information and hydrological features are:

Powell, R. & Emberson, J. *Growing Locals* (1996); Western Australian Naturists Club, WA

Mc Arthur, WM & Bettenay, E (1974) *The Development and distribution of the Soils of the swan Coastal Plain*, CSIRO Publication No.16

Rippey, E. & Rowland, B. *Plants of the Perth Coast and Islands* (1995) University of Western Australia Press, WA

3.0 The Road Network in the City of Wanneroo

3.1 Existing Road Networks

The existing road network in the City of Wanneroo possesses a variety of streetscapes indicative of the diverse land uses present in the City. Whilst the spatial form of streetscapes differs greatly in response to land uses they are predominantly dictated by a hierarchy consisting of Primary, Secondary and Tertiary road types. Primary roads represent the major arterial routes, Secondary roads allow access to suburbs and Tertiary roads represent the finer weave of the residential streets.

The Primary Road Network displays a further distinction between the roads that run in a north-south direction, such as Wanneroo Road and Marmion Avenue, and those that run in an east-west direction, such as Hepburn Avenue and Beach Road. The East-West roads provide access to the suburbs and carry a lower volume of traffic whilst north-south roads generally carry a larger volume of traffic and provide access to the greater metropolitan area.

The road network also provides access to farming areas predominantly located in the eastern section of the City. This road network is characterised by relatively long stretches of open road, sharing characteristics with the major arterial routes whilst carrying a significantly lower volume of traffic.

3.2 Future Road Networks

In recent years the significance of public infrastructure, of which transport networks are a critical component, has gained prominence as the basis of a healthy urban environment.

As such public infrastructure is seen as the foundation of urban form and transport networks provide one of the greatest challenges to

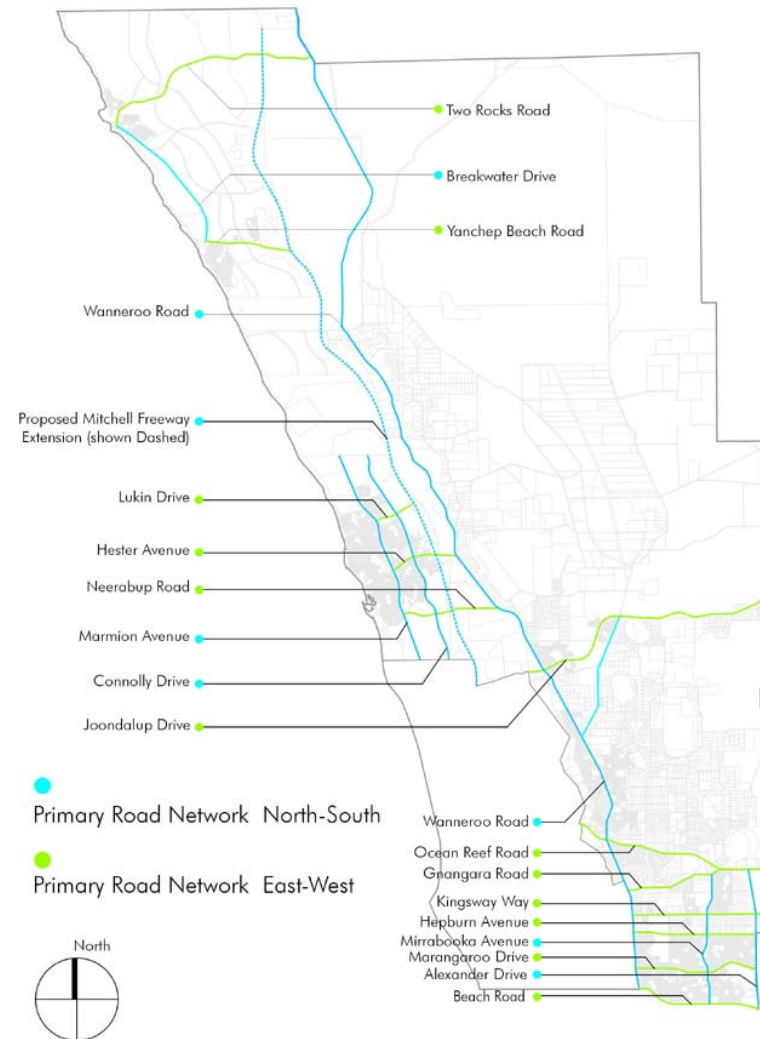


Figure 14 Primary Road Network in the City of Wanneroo

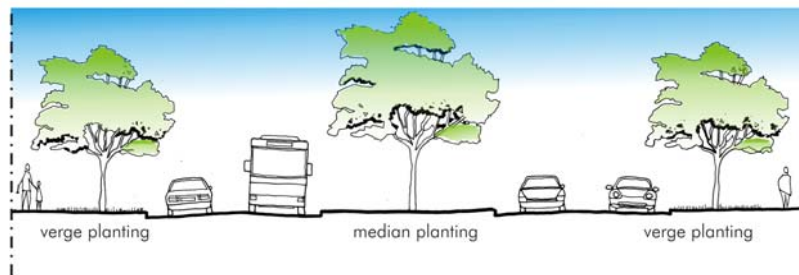
sustainability with the aim of providing efficient and equitable mobility for all users.

The increased concern for a sustainable transport network has prompted a revised approach to the design of new roads, and was applicable or adaptable to modifications to existing roads. This approach is fully outlined in the publication *Liveable Neighbourhoods - A Western Australian Government Sustainable Cities Initiative, Edition 2* (2000), which promotes the inclusion of cyclists, public transport, private vehicles and freight with increased safety measures and increased focus on the visual and environmental components of streetscapes.

3.3 Metropolitan Functional Road Hierarchy

The City of Wanneroo's road network is managed in accordance with its function. The Metropolitan Functional Road Hierarchy (MFRH) was derived in order to:

- Make roads easier to use – roads will be managed in a way to make their function more obvious to users. Roads of the same function will have similar traffic management measures regardless of location. This will mean less unexpected traffic devices on unfamiliar roads.
- Make roads easier to manage – Management decisions will only need to be within the scope of appropriate measures for the designated function.
- Make easier planning – Land use and road function are closely related. It will communicate the intended function of roads to existing and prospective landholders.



Typically 60m Reserve

Primary Distributor (MFRH & LN)
(2 lanes with central median, no parking embayment)

The road types and criteria are summarised as follows:

Primary Distributors

These provide for major regional and inter-regional traffic movement and carry large volumes of generally fast moving traffic. Some are

strategic freight routes and all are National or State roads. They are managed by Main Roads. Wanneroo Road within the City of Wanneroo is the only road that falls into this category.

District Distributor A

These carry traffic between industrial, commercial and residential areas and generally connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining property. They are managed by Local Government. Typically Hepburn Avenue, Mirrabooka Avenue and Hester Avenue fall into this category.

District Distributor B

Type B District Distributors perform a similar function to type A District Distributors but with reduced capacity due to flow restrictions caused by access to and roadside parking alongside adjoining property. These are often older roads with a traffic demand in excess of that originally intended. District Distributor A and B roads run between land-use cells and generally not through them, forming a grid which would ideally space them around 1.5km apart. They are managed by Local Government. Typically Two Rocks Road, Flynn Drive, Lenore Road and Girrawheen Avenue fall into this category.

Local Distributors

Local Distributors carry traffic within a cell and link to District Distributors at the boundary to access roads. The route of Local Distributors discourages through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to or serving the area. These roads should accommodate buses but discourage trucks. They are managed by Local Government. Typically Quinns Road, Clarkson Avenue and Dundobar Road fall into this category.

Access Roads

Access Roads provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement



Varies 25-60m Reserve

District Distributor (MFRH)
 Integrator Arterial (LN)
 (2 lanes with central median, no parking embayment)



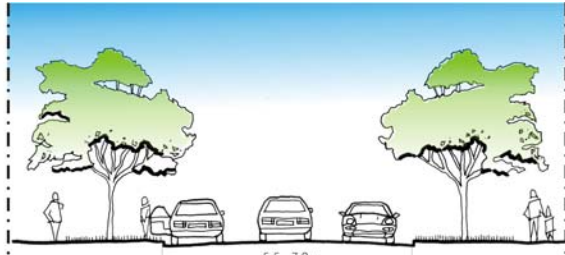
Typically 25m Reserve

District Distributor (MFRH)
 Integrator Arterial (LN)
 (2 lanes with central median, parking embayment)



Typically 20m Reserve

Local Distributor (MFRH)
 Neighbourhood Connector (LN)
 (no median, parking embayment)



Typically 16m Reserve

Access road (MFRH)
 Access Street (LN)
 (no median, with optional parking embayment)

Figure 15 Typical sections of roads relevant to the City of Wanneroo
 Adapted from *Liveable Neighbourhoods*, Edition 2 (2000), Western Australian Planning Commission.

function. These roads are bicycle and pedestrian friendly. They are managed by Local Government.

A full description of the Metropolitan Functional Road Hierarchy Road Types and Criteria is tabled in Appendix A.

Recent land planning reform through the introduction of *Liveable Neighbourhoods* (LN) concept has resulted in reclassification of the road types. In summary reflected as follows:

Metropolitan Functional Road (LN) Hierarchy (MFRH)	Liveable Neighbourhoods
Primary Distributor	Primary Distributor
District Distributor A&B	Integrator Arterials
Local Distributors	Neighbourhood Connectors
Access Roads	Access Streets

3.4 Street Tree Location

Street trees generally occur in 2 places in the streetscape:

Median Strips

The median strip, located in the centre of the carriageway, can vary from 1 to 6 m in width, presenting a place to locate street trees. It is particularly useful if the verges are particularly tight and private property setbacks are small as it can provide foliage to both sides of the street. The median may also provide planting locations if overhead power lines prohibit planting on either verges.

Nature Strips

The nature strip, as defined in the *Road Traffic Code 2000* and previously known as the verge, are located on either side of the road carriageway. They provide planting locations that contribute to an

avenue effect. This space is also shared by pedestrian and cyclist paths, parking and public infrastructure such as overhead power lines and underground services.

3.5 Summary of the Road Network

The City of Wanneroo has a number of different road types based on adjacent land uses and a typical primary, secondary and tertiary road hierarchy. New developments and upgrades of the existing road networks will, wherever possible be based on the *Liveable Neighbourhoods* model.

The Street Tree Master Plan list will continue to refer to road types using *Liveable Neighbourhoods* terminology as discussed in Section 3.3.

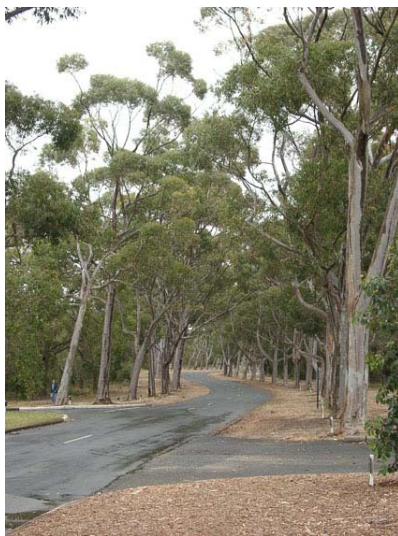


Figure 16 Avenue street trees are an important element in creating a successful streetscape eg. Sugar Gums (*Eucalyptus cladocalyx*) Lovekin Drive, Kings Park, Perth.

4.0 The Role of the Tree in the Streetscape

In the City of Wanneroo, trees from private property, public open spaces, agriculture, and commercial practices all make valuable contributions to the streetscape. Street trees however, are specifically defined as those trees in the road reserve located on the nature strips, median strips and traffic islands as well as focal points and other planting that primarily address the streetscape. Street trees provide a number of positive elements to a streetscape. These include:

- Visual and spatial unity in a streetscape.
- Articulation of focal points and distances.
- Definition of boundaries and corridors at a local scale.
- Delineation of pedestrian and vehicular spaces within the streetscape .
- Traffic calming.
- Shade for pedestrians and vehicles.
- Positive manipulation of the streetscape microclimates.
- Increased land values through preferable lifestyles.
- Reduced impact of exhaust emissions through tree respiration.
- Habitat for avifauna and other animal life.
- Wildlife corridors between natural bushland areas.

In the City of Wanneroo street trees also cover remnant vegetation located in the road reserve and trees located in the road reserves of National Parks.

4.1 Existing Streetscapes

Many streets within the City of Wanneroo have street trees creating a distinct streetscape. Where streetscapes with street trees already exist, new trees planted in extensions to existing roads or to replace those that have died will match the others in the street design rationale of the existing streetscape. Street tree requests are assessed by the City of Wanneroo to ensure that the tree is in keeping with the existing streetscape and will meet criteria for suitable street tree. The City of

Wanneroo has produced a brochure entitled; *Nature Strip (Verge) Treatment Guidelines* to assist residents in carrying out landscaping and other improvement works to the nature strip adjoining their property.

Street trees have a number of uses that require a considered design approach. These are listed below:

4.2 Avenue Tree Planting

Street trees are typically planted in avenues of regular spacing on the verges and median strips.

4.3 Buffer/Combination Screen Planting (BC)

Tree species that are suitable as part of noise attenuation and visual screening are identified as buffer species. They are typically located on the Primary Distributor and Integrator Arterial road types and may be a backdrop for taller trees that are closer to the carriageway. Local plant species should be used whenever there is no specific purpose that excludes their use.

4.4 Public Open Space (POS)

Road reserves adjoining public open spaces (POS), bushland sites and regional parks present opportunities to use species that would not normally be used as street trees due to the relaxed spatial requirements. Road reserves adjoining public open space present the opportunity to plant larger trees due to the increased amount of space and reduced risk of impact on surrounding buildings and public infrastructure. In road reserves adjoining bushland sites and regional parks, any remnant trees should be conserved. Any additional street tree planting should also be locally native to strengthen the presence of bushland in the City of Wanneroo.



Figure 17 Buffer planting can be used as a windbreak or visual screen. Eg. Benmuni Road, Wanneroo.



Figure 18 Street tree planting can enhance the identity of a retail precinct. Eg. The Golden Locusts (*Gledetsia tricanthos*) in Paley Park, New York have become famous.

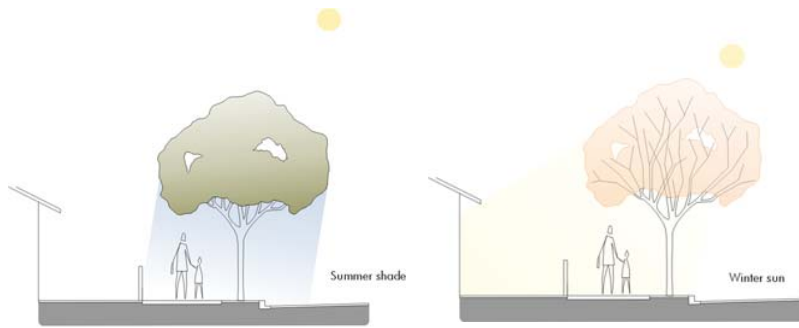


Figure 19 Deciduous street trees can be used to good effect areas of high density or narrow road reserves.



Figure 20 Landmark street trees can be used to reinforce the identity of the landscape. Eg. Norfolk Island Pines mark the entry to Hyde Park, Highgate.



Figure 21 Feature street trees can be used to improve the legibility of the road hierarchy. Eg. Santa Barbara Parade & James Cook Avenue, Quinns Rocks.

4.5 Retail and Commercial Precincts (RC)

Trees in retail and commercial precincts assist in providing an attractive identity and act as a visual indication of a change in land use. Trees in retail and commercial precincts should be used to shade car parks and pedestrian thoroughfares. Deciduous trees can be used along north facing building facades and outdoor plazas where passive solar principles apply.

4.6 Passive Solar (PS)

The significance of trees in relation to microclimates and the thermal performance of buildings require the consideration of planting to aid thermal comfort through passive solar design. Medium to high density urban areas may benefit from the selection of deciduous trees to provide shade in summer whilst allowing warmth and light to enter during winter, particularly if there are narrow Access Streets and laneways where the road reserve is 14m or less.

4.7 Landmark (LM)

Landmark tree species are trees that are of significant stature as to provide a major contribution to the legibility of the landscape in which they are located. The Norfolk Island Pine is one example as it contributes to both streetscape experienced by pedestrians and vehicles as well as being prominent on the skyline as a significant cultural addition to the landscape. The significance of landmark tree species requires that they are located carefully with consideration to their impact on the overall landscape.

4.8 Feature Trees (FT)

Feature trees are often used to increase the legibility of the road network, by providing visual cues at the entry of new developments, commercial precincts, intersections and roundabouts.

5.0 Design Parameters

A number of design parameters influence the selection, application and management of street trees. The decision of what tree to use will usually require the consideration of:

- Aesthetic criteria- the habit, growth, form and streetscape experience intended.
- Environmental criteria- the impact of the selected planting on the environment.
- Economic criteria- The ability to maintain the planting during initial phases and in an ongoing capacity.
- Residential criteria – the impact of the selected planting abutting residential property.

5.1 Street Context

When planning a streetscape consideration must be given to the aesthetic and cultural character of the area. Parameters that impact on the tree selection include the scale of the street, adjoining land uses, continuity with surroundings and recognition of features within the area, including parks or significant buildings.

Recommendations:

- Consider the scale of the street – width of street and height of buildings on either side determine the size of the tree.
- Consider the adjoining land uses (commercial, residential, retail, POS), access requirements and the quantity of pedestrian and vehicular traffic.
- Provide continuity and consistency along a whole street. Each street should have single character along its whole length.
- Where streetscapes with street trees already exist, new trees planted in extensions to existing roads or to replace those that have died will match the others in the street design rationale of the existing streetscape.
- Use trees to complement the existing features of the streetscape.

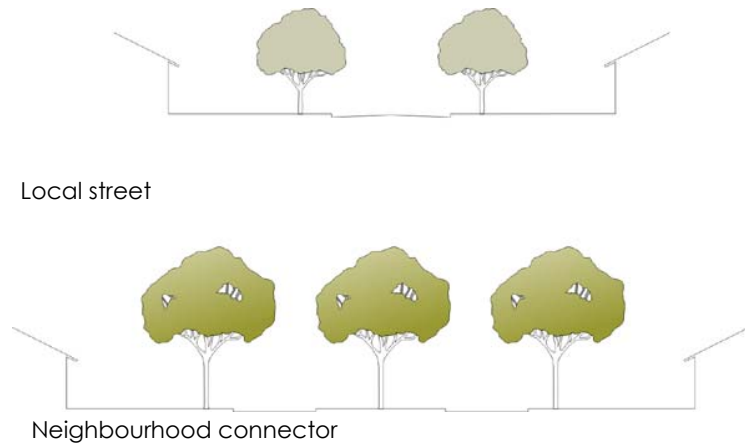


Figure 22 Use a street tree that suits the scale of the street. Smaller trees suit narrow road reserves, while larger trees are suitable in large road reserves.

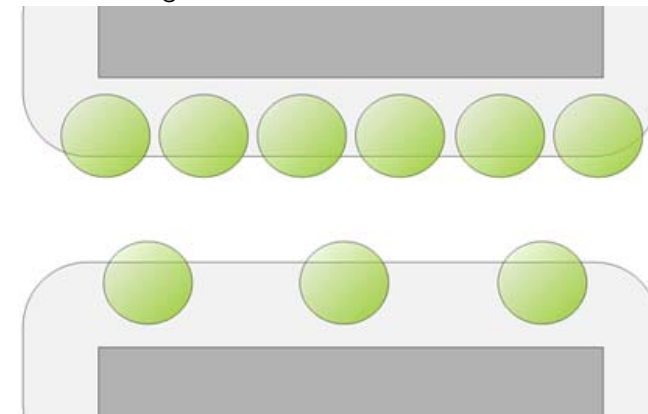


Figure 23 To create a distinctive streetscape the trees should be planted close together. This diagram illustrates the effect of close tree planting vs distant tree planting.

5.2 Tree Spacing

Tree spacing will be driven by the size of the selected tree, cost implications as well as safety, visibility, vehicular thoroughfares and the desired effect on the streetscape. If the tree spacing is close together it gives an atmosphere of confinement that can aid in traffic calming measures. If they are far apart and evenly spread they can convey the sense of an open boulevard with views to the spaces beyond. When setting tree spacing the mature size of the trees, the proportion of the trunk and canopy, and how they will impact on each other need to be taken into account. Large trees that work best on the larger road reserves do not require such dense spacing because the shading capacity is less important and they are usually experienced at greater speeds.

5.3 Tree Planting & the Environment

5.3.1 Local Environmental Strategy

The City of Wanneroo prepared a Local Environmental Strategy in 2002. Key areas of the strategy include biodiversity, the greenhouse effect, and water management. Street tree planting in the urban environment can provide numerous environmental benefits within these key areas. Tree planting is becoming increasingly recognised for its contribution to the reduction of green house gas levels. The use of locally native species can contribute to local biodiversity by providing wildlife corridors and enhancing native remnant bushland.

Recommendations:

- Provide street trees on all streets throughout the City.
- Promote planting of locally native tree species particularly adjoining existing bushland, wetlands, Bush Forever sites, National Parks and Landscape Enhancement Areas.
- Use street trees that are drought tolerant.
- Retain any remnant locally native trees that occur in the road reserves.



Figure 24 Streets in the Landscape Enhancement Areas should be planted with locally native tree species.

Figure

5.3.2 Preference for Locally Native Trees

The City of Wanneroo has a preference for the use of locally native tree species as street trees. Native trees, local and Australian, have many advantages that are consistent with the environmental focus of the City of Wanneroo. However, the City of Wanneroo recognises that in certain situations (for example where there are passive solar requirements) exotic trees, particularly deciduous trees, may be an appropriate selection.

The use of exotics in combination with natives within the road reserve will be considered in a favourable manner by the City when assessing landscape plans for approval. Such consideration would need to be supported by appropriate justification based on sound design principles and the mix of exotic and native species design in such a manner that the streetscape not only appeals from an aesthetic perspective, but also addresses traffic management (pedestrian, cyclist and vehicular movements) and associated road safety implications.

5.3.3 Weeds

Some trees, including Australian and local species, have the potential to become weeds if planted in inappropriate settings. Weeds can occur in a number of ways:

- Excessive growth, such as suckering.
- Growth in ecologically sensitive areas, competing with locally native plant species.
- Blocking of waterways and adverse effects on waterway margins.

Advantages of Australian species

- Resilience in local conditions.
- Tolerance to drought and water logging.
- Generally reliable growth rates and habit.
- Reduced maintenance, pruning, reticulation and fertilizer applications.
- Comparatively lower resource use, including water and fertilizer.
- Comparatively lower nutrient loads entering the groundwater and water bodies through applied fertilizer and seasonal leaf drop, particularly in wetland areas.
- Reduced possibility of weed species.
- Provide wildlife corridors between natural bushland areas.

Advantages of Exotic Species

- Deciduous trees allow sunlight and warmth to enter during winter.
- Some species exhibit seasonal interest such as autumn colour and spring flush

Figure 25

List of Environmental Weed Species of Actual and Potential Significance in WA (CALM)

Refer to Appendix B for Detailed Criteria for Assessment and Rating

- **High** - Rating a weed species as high would indicate prioritising this weed for control and/or research ie prioritising funding to it. Trees that fall into this category include:

Leptospermum laevigatum

- **Moderate** - Rating a weed species as moderate would indicate that control or research effort should be directed to it if funds are available, however it should be monitored (possibly a reasonably high level of monitoring). Trees that fall into this category include:

Eucalyptus citriodora	Ficus carica	Pinus pinaster
Eucalyptus cladocalyx	Olea europaea	Pinus radiata
Eucalyptus maculata		

- **Mild** – a weed species scoring one of the criteria. A mild rating would indicate monitoring of the weed and control where appropriate. Trees that fall into this category include:

Eucalyptus botryoides Washingtonia filifera

- **Low** – A low ranking would mean that this species would require a low level of monitoring. Trees that fall into this category include:

Acacia baileyana	Eucalyptus muelleriana	Pinus canariensis
Cassia fistula	Eucalyptus polyanthemus	Pinus halepensis
Casuarina cunninghamiana	Eucalyptus saligna	Pinus pinea
Casuarina equisetifolia	Gleditsia triacanthos	Platanus x acerifolia
Casuarina glauca	Grevillea robusta	Populus alba
Eucalyptus globules	Lagunaria patersonii	Populus nigra
	Mangifera indica	Salix babylonica
		Tamarindus indica
		Ulmus procera

Adverse effects from deciduous street tree species may also become evident a long way from the planting as the leaf drop of deciduous trees can contribute to excessive nutrient loading into waterways borne through artificial runoff systems as well as ground water.

5.3.4 Fire Management

Since a high proportion of the City of Wanneroo is rural, remnant bushland, and National Parks, fire is a major concern.

The use of street trees poses minimal additional risk to this condition if management and maintenance of the trees are continued as part of the general upkeep of the road reserve. In many instances street trees may reduce the risk posed by fires as they act as windbreaks, reducing the impact of spot fires.

To reduce the risk of fire street trees require regular maintenance to remove dead foliage, twigs and branches and clearing of the ground below to create an effective barrier. There are a number of measures that may be taken to reduce the risk of fire transmission through street trees, particularly in areas with a high risk:

Recommendations:

- In areas of high risk use fire resistant or hard to burn street tree species.
- Select trees that have smooth bark or do not shed their bark readily.
- Select trees with a natural high salt content.

- Space trees with an adequate distance to remove the possibility of transmission through the canopy.
- Implement an effective tree management program to maintain trees by removing dead branches and ground leaf litter.
- Allow significant clearance between the ground and canopy.
- Maintain a safe distance from power lines as stipulated by Western Power (refer to the next section Trees and Public Infrastructure).
- Be mindful of the proximity to the built environment in bushfire prone areas and do not allow the predicted canopy to overhang nearby buildings.

5.4 Trees and Public Infrastructure

Street trees within the City of Wanneroo generally exist in road reserve surrounded by public utilities include power, gas, water, sewer and built infrastructure such as footpaths, kerbs and roadways. Main Roads WA has Code of Practice for Utility Providers which guides the protection of utilities in road reserves. The document recommends suitable location for tree planting within the road reserve in relation to public utilities and infrastructure. It also deals with the protection of stands of native vegetation within the road reserve. The document is available on Main Roads WA website (www.mainroads.wa.gov.au). Street trees may impact on public infrastructure and the built environment in a number of foreseeable ways:

- The canopy can conflict with streetlights, overhead power lines and buildings.
- Invasive root systems that enter utilities and damage built infrastructure.

Recommendations

- Preserve existing street trees when installing or upgrading public infrastructure.

Figure 26 More fire resistant native trees include:

Lilly Pilly	<i>Acmena smithii</i>
Juniper Myrtle	<i>Agonis juniperina</i>
Apple Jack	<i>Angophora costata</i>
Kurrajong	<i>Brachychiton populneus</i>
River She-Oak	<i>Casuarina cunninghamiana</i>
Spotted Gum	<i>Eucalyptus maculata</i>
Moreton Bay Fig	<i>Ficus macrophylla</i>
Coastal Hibiscus	<i>Lagunaria patersonii</i>
Moonah	<i>Melaleuca lanceolata</i>
White Cedar	<i>Melia azedarach</i>
Sweet Pittosporum	<i>Pittosporum undulatum</i>
Brush Box	<i>Lophostemon conferta</i>

Introduced plants that are hard to burn include:

Common Maple	<i>Acer campestre</i>
Norway Maple	<i>Acer negundo</i>
Evergreen Alder	<i>Alnus jorullensis</i>
Carob	<i>Ceratonia siliqua</i>
Ash	<i>Fraxinus spp.</i>
Bay Tree	<i>Laurus nobilis</i>
Olive	<i>Olea europaea</i>
Red-leaf Photinia	<i>Photinia glabra</i>
Plane Tree	<i>Platanus orientalis</i>
Popular	<i>Populus spp.</i>
Cherry laurel	<i>Prunus laurocerasus</i>
Portugal Laurel	<i>Prunus lusitanica</i>
Algerian Oak	<i>Quercus canariensis</i>
Holly Oak	<i>Quercus ilex</i>
English Oak	<i>Quercus robur</i>
Willow	<i>Salix babylonica</i>
Pepper Tree	<i>Schinus molle</i>
Tamarix	<i>Tamarix aphylla</i>
Elm	<i>Ulmus spp.</i>

List adapted from NSW Rural Fire Service. Please contact your local nursery to obtain a list of plants suitable for your area.

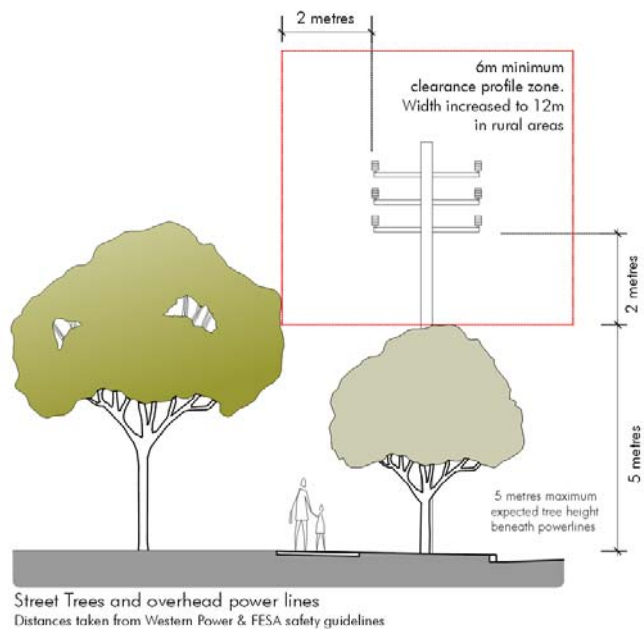
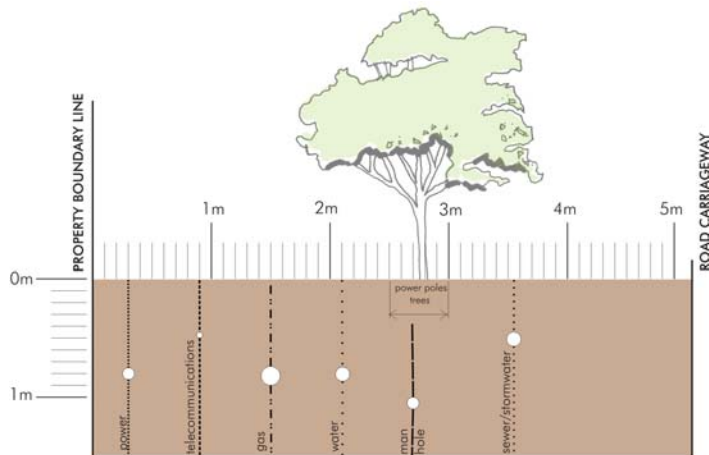


Figure 27 Western Power and FESA require a 2m clearance around power lines.



Utility providers' standard service alignment
Distances taken from *Liveable Neighbourhoods*, WA Planning Commission, 2000.

Figure 28 Location of underground services in the verge.

- Placement of trees should be determined in relation to underground and overhead services.
- Consider planting street trees under the overhead wire closest to the road kerb to facilitate formative pruning over the road surface to form a canopy.
- Use street trees that suit the location. For example, low trees should be planted next to power lines.
- Obtain approval prior to clearing native vegetation (from the City of Wanneroo and Department of Environmental Protection) from a road reserve.
- Contact **Dial before you dig (WA)** to confirm service alignment within developed road reserves prior to tree planting. Telephone: 1100 website (www.dialbeforeyoudig.com.au)
- Seek to minimise invasive roots damaging public infrastructure and all buildings, through species selection.
- Trees in urban areas must be planted with an effective physical root barrier as required by City of Wanneroo to protect against root damage.
- Consider the impact to surrounding utilities by mature planting.

5.5 Trees and Road Safety

Trees in the road reserve should be planted according to Main Roads WA *'Environmental Guidelines – Vegetation Placement within the Road Reserve'*. The document set outs recommended vegetation setbacks and clearances on roads to ensure drivers have good visibility of pedestrians and other vehicles, particularly at intersections. Street trees can also assist in road safety to calm traffic by creating a sense of confinement. Enclosing the street with trees reduces motorists' peripheral vision prompting them to drive at slower speeds.

Recommendations

- Consider the location of the planting in relation to on-street parking, footpaths and setbacks, sightlines and intersections.

- Consider the impact of the planting in relation to sightlines and safety.
- Maintain street trees to a minimum of two metres between the ground and canopy to keep clear sight lines for pedestrians and vehicles.

5.6 Tree Management

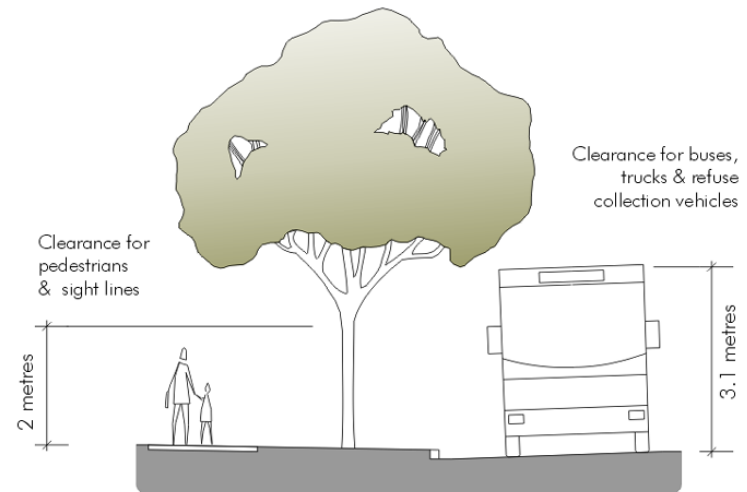
It is essential for the City of Wanneroo to manage, protect and maintain trees for the benefit of the community. Street trees are a long term asset and, once mature, are irreplaceable in a short period of time. The City of Wanneroo needs to develop a street tree maintenance strategy that:

- Ensures that tree care and maintenance is performed to Australian Standards level (AS-4373-1996 Pruning of Amenity Trees).
- Conducts regular audits of street trees using the City of Wanneroo 7.3.2 policy manual regarding upgrades to distributor roads and parks.
- Maintains historically accurate data relating to street trees.

5.6.1 Tree Protection

Work on public infrastructure and structures in proximity to street trees should be mindful of the adverse impacts of excavation and soil compaction on the trees' root systems and take steps to avoid disturbing them. Since a majority of a tree's root system occurs in the 500mm of soil located beneath the drip line, excavation in this area should be avoided. Also, compaction of soil in the drip line due to vehicle traffic or heavy temporary structures can also adversely affect the trees' root system and should be avoided. Trees also need protection from wind damage when young, vehicle damage and vandalism.

- Use shelters to establish trees in coastal environments.
- Use bollards, tree stakes, or tree guards to protect trees located in the median or next to car parking.



Street tree clearances
Distances taken from Metric Handbook
Adler, D.

Figure 29 It is important to maintain clearances to ensure sightlines between pedestrians and vehicles are clear.

- Significant earth works and level changes near mature street trees should consider the extent of the trees' root system.
- When trenching in verge, consider trenching under tree instead of along side the tree to minimize root damage.

5.6.2 Growth & Maintenance

All trees have an expected growth habit dictated by their species type that is also affected by local environmental conditions and human interaction. All trees in the road reserve should be encouraged to attain their expected habit through correct pruning and maintenance techniques. This can be achieved primarily through good species selection as well as consideration of the surrounding elements of the streetscape and the implementation of a maintenance routine that can minimise the adverse impact of street trees.

5.6.3 Tree Pruning

Tree pruning may occur for a number of reasons:

- Formative pruning during initial planting stages.
- Removal of limbs that constitute a physical or visual obstruction or pose to be a hazard if dead or dying.
- Removal of invasive or destructive roots.

All modifications to trees including root systems should be carried out by qualified tree surgeons to minimise the risk of disease entry and damage to adjacent property.

5.6.4 Tree Removal

The removal of trees may occur for a number of reasons:

- An obstruction to the safe functioning of a streetscape through physical or visual obstruction.
- Destruction of public infrastructure and structures by root systems and branches.
- Senescent trees that detract from the overall character of the streetscape.

- Trees that are disease affected and likely to die shortly or transmit the infection.
- Trees that constitute an undue burden on the City of Wanneroo tree maintenance program.

Tree removal will be carried out by council staff or qualified tree surgeons using all of the necessary safety equipment to below ground level for safety and to minimise the possibility of re-growth. Tree surgeons should have adequate public liability insurance. Removal of street trees in the road reserves requires the permission of the City of Wanneroo.

5.6.5 Tree Availability and Planting

The availability of trees from commercial growers varies due to seasonal and species demand as well as application requirements. Current industry practice indicates that if a substantial number of trees in avenue planting are proposed it is recommended that they be selected at least a year in advance. Trees need to be a minimum of 2m high at the time of planting. Planting should occur in the wetter months from April to October for unirrigated trees. Planting of irrigated trees can occur throughout most of the year provided adequate watering is undertaken. At the time of planting the trees should be tied and staked to City of Wanneroo standards.

5.6.6 Impact of Tree Selection on Maintenance

Trees must be selected that are suitable to the location, their function in the streetscape and the reduction in ongoing maintenance and resource use. Trees shed bark, leaves, twigs and limbs as well as having the cyclical process of flowering and fruiting. These characteristics of trees can dictate their suitability to the streetscape environment and can pose a risk to public safety and impact on maintenance routines including mowing and street cleaning.

TYPICAL TREE PLANTING DETAIL

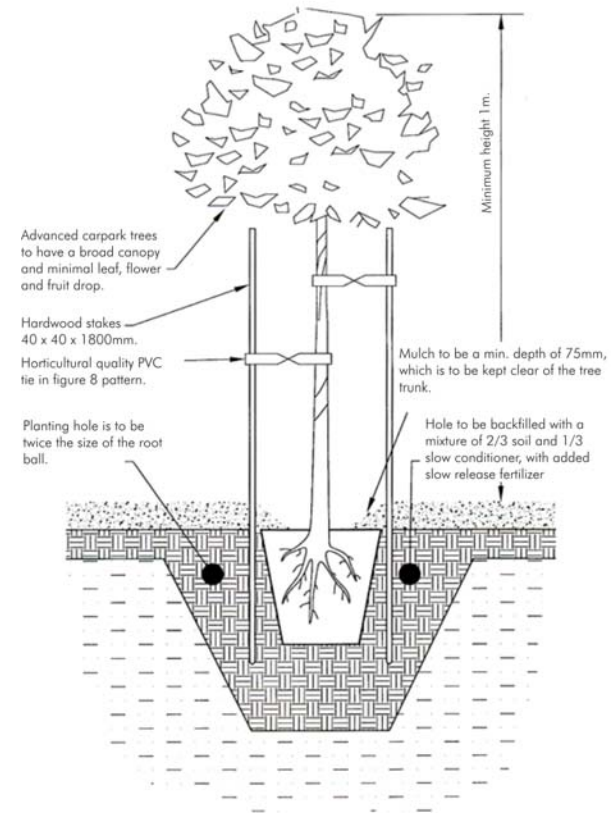


Figure 30 Tree planting detail.

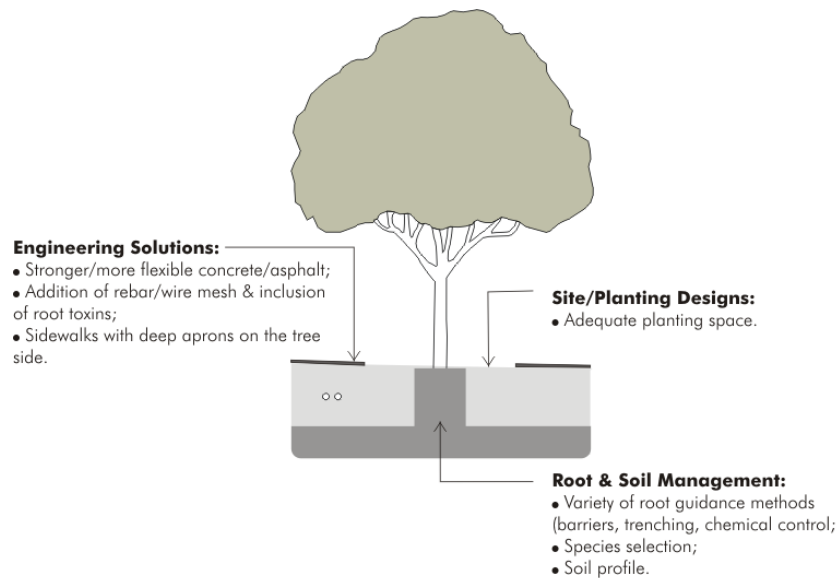


Figure 31 Preventative options available to protect public infrastructure from root damage.

5.6.7 Planting in Urban Scenarios

Planting in urban situations often results in economic costs in terms of infrastructure damage by tree roots. Factors associated with infrastructure damage include:

- Restricted planting space;
- Tree species (ie the wrong tree in the wrong location);
- Tree size;
- Soil type (ie soil with hardpan or other root-limiting zone);
- Inadequate design or engineering.

Following are a range of proactive strategies available to prevent or reduce infrastructure damage by tree roots:

- **Root & Soil Management Solutions** (that direct roots away from the infrastructure);
- **Site/Planting Designs and Planning Solutions** (that minimize potential for root-infrastructure contact);
- **Engineering Solutions** (including ideas for materials that with withstand root damage, site preparation and directional root growth).

5.6.8 Street Tree Planting adjoining National Parks, Rural and Remnant Vegetation Areas

Planting in road reserves adjoining areas of remnant vegetation should seek to enhance the naturally occurring vegetation. Care must be taken to restrict street tree species to tree species that are actually present at the site to prevent an adverse impact on existing plant communities. It is preferable that these trees are grown from locally sourced seed. This is necessary to maintain the gene pool of specific areas. Street tree planting in road reserves adjoining National Parks should only be undertaken in conjunction with CALM. For further information regarding remnant vegetation in road reserves refer to the *Local Government NRM Policy Manual Landscaping Guidelines DRAFT 6/2003*.

6.0 Landscape Character Units for Street Tree Planting

To assist the implementation of the Street Tree Master Plan the City of Wanneroo is divided into number of broad landscape units. The units are based on landform, soil and exposure to the coastal influences, as well as land use and existing vegetation. They help define a visual character that can assist in the appropriate selection of plants. The City has been divided into the following landscape character units:

- Coastal Landscape
- Dunes Landscape
- Lakes Landscape
- Eastern Plain Landscape

6.1 The Coastal Landscape

The Coastal Landscape is distinguished by the Quindalup soil type, beginning at the coast and extending inland to where they meet the Spearwood dune system. The coastal zone has a locally native vegetation cover of low-lying heathland above undulating dune topography. The coastal environment impacts significantly on trees within this zone. Trees have to endure strong winds, salt spray, dry heat and loose saline sands.

Recent land use has seen the development of residential subdivisions of a suburban nature as well as accompanying commercial and recreational precincts. Future land use will see a substantial increase in the amount of residential development with land release areas that cover a majority of the coastal zone expected in 2012 (Refer to Figure 2 – Future Landuse Diagram).

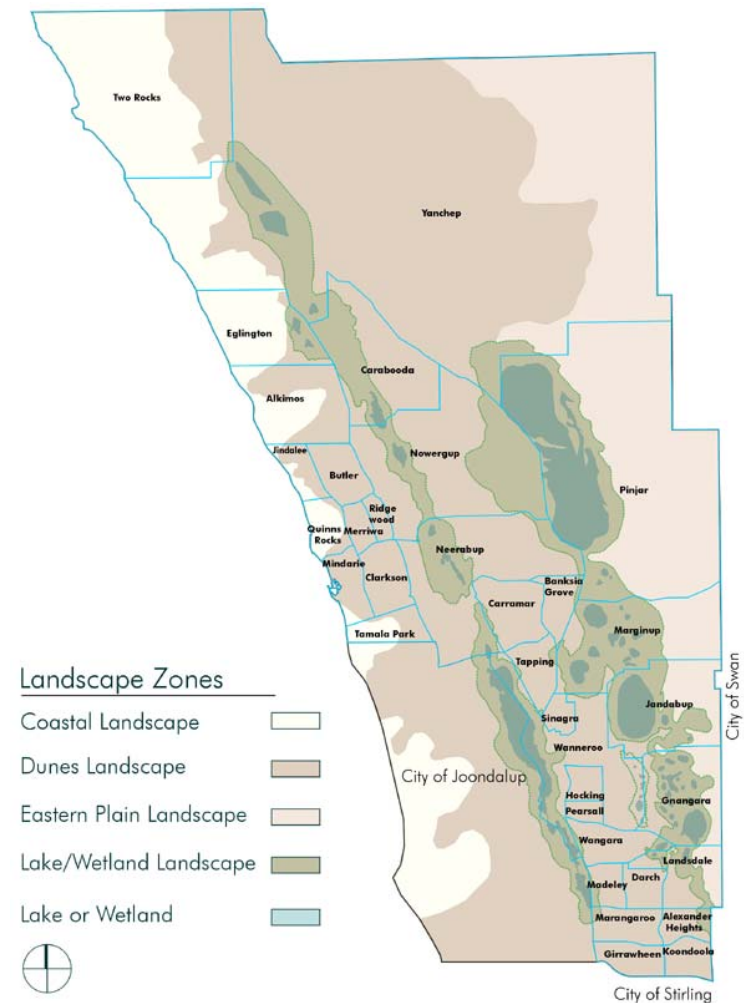


Figure 32 Landscape Character Units for Street Tree Planting



Figure 33 Coastal Landscape Planting Structure consists of uniform avenue planting of Australian coastal tree species, contrasted by tall feature and landmark

6.1.1 Coastal Landscape Street Tree Planting Structure

The aim of the Street Tree Master Plan in the coastal area is to aid the appropriate selection of street trees in the area, particularly future residential developments. The locally native, low lying vegetation is an indication of what will grow best in the unconsolidated soils of the Coastal Landscape and special consideration has to be given to water efficiency and possible wind damage that may occur.

The coastal identity should be reinforced through the use of coastal planting themes. Street tree planting generally should be Australian native trees suited to coastal conditions. Tall feature and landmark trees should be used to provide a contrasting vertical element in relation to the surrounding low vegetation and undulating topography and aid legibility of the road hierarchy.

The street tree planting should reinforce reoccurring planting themes used along the Perth coastline:

Themes used to identify major coastal landmarks and parks:

Norfolk Island Pines – Town of Cottesloe, City of Fremantle
Moreton Bay Fig – City of Fremantle, Rottnest Island

Themes used along roads:

Olive Trees – City of Rockingham (Secret Harbour)
Peppermint Trees - City of Rockingham
Coastal Sheoak – City of Joondalup, Town of Cambridge
Rottnest Island Tea tree – City of Fremantle, Rottnest Island

6.2 The Dunes Landscape

The Dunes Landscape is a young undulating dune system, running parallel through the centre of the City of Wanneroo. Both the Cottesloe and Karrakatta soil associations are present. Better soils have resulted in intensive agriculture and horticulture occurring in this area, particularly in the north, around the Wanneroo village. The growth of

the metropolitan area, mostly since the 1970's, has occurred in the southern section, along the Wanneroo Road corridor. The southern suburbs, now relatively established, reflect town planning patterns of the era, and are characterised by large, mature eucalyptus street tree planting. More recent suburban growth reflects a change in urban design. The street tree planting patterns exhibit a shift towards exotic and deciduous trees. Large areas of natural woodland have been retained throughout this landscape unit. Due to the large incidences of large trees in the environment there is a tendency for street trees to merge into the background.

6.2.1 Dunes Landscape Street Tree Planting Structure

The soils are fertile enough to accommodate a broader variety of tree species. There is an opportunity to re-establish the native landscape theme and reinforce the natural landscape of Wanneroo. There should be an emphasis on creating strong avenues of street trees, particularly on the wider streets, with large Australian trees. Deciduous and exotic trees should be used to accentuate features and landmarks within the streetscape.

6.3 The Lakes Landscape

The Lakes Landscape encompasses two significant lake systems identified by the City of Wanneroo, Linear Lakes and Circular Lakes. Both the Linear Lakes and Circular Lakes are important habitat for avifauna and play a significant role in the cultural, historical and recreational conditions of the City.

The lakes are associated with the dune system, and form where the soil drainage is poor. They are characterised by the Herdsman soils (Linear Lakes) and Bassendean swamp soils (Circular Lakes). The lakes are hydrologically linked and drain in a southerly direction towards the Swan River. For these reasons, the Linear Lakes and Circular Lakes are recognised as a Landscape Enhancement Areas by the City of



Figure 34 Eastern Plain and Dune Landscape Planting Structure consists of uniform avenue planting of tall Australian trees. Exotic trees are used to identify features and landmarks in the streetscape.

Wanneroo and require special consideration when landscape treatments are proposed and implemented.

6.3.1 Lakes Landscape Street Tree Planting Structure

The aim of the Street Tree Master Plan is to contribute to the enhancement of Lakes Landscape through the selection of trees that are appropriate to a wetland location. Trees in this area need to be able to withstand regular inundation. However development of these areas for residential use will more than likely involve the importation of fill and therefore trees may not need to be tolerant to water logging.

It is equally important to minimise the possibility of tree species selection that may adversely affect the ecologically sensitive area and trees that have the potential to become weeds need to be avoided.

6.4 The Eastern Plain

The Eastern Plains Landscape includes rural areas, banksia woodlands and pine plantations in the northern part of the City of Wanneroo. Hence, due to the largely rural and bush character of the area, formal street tree planting does not occur very often. The Bassendean Soil Association is typical of the Eastern Plains Landscape. The soils are leached, poor in plant nutrients and have low natural fertility¹. The soils are also excessively drained². Despite the quality of the soil the natural vegetation is diverse. Street trees planted unless locally native will grow with the application of fertilizers.

¹ Bettenay, E. McArthur, W.M. Hingston, Soil Associations of the Swan Coastal Plain, WA

² Seddon, George Sense of Place

6.4.1 Eastern Plain Landscape Planting Structure

Due to the increased occurrence of locally native flora and fauna in the area the street tree strategy aims to enhance these characteristics and calls for a first preference of locally native and Australian species. This is also due to the environmentally restrictive conditions in the area and the restricted number of trees that will actually grow there.

7.0 Specific Design Requirements

The analysis identifies four major road types that are, or may be, constructed in the City of Wanneroo. They are the Primary Distributor, the Integrator Arterial, the Neighbourhood Connector and the Access Street. The Street Tree Master Plan is structured to respond to this by making a distinction between the large Primary Distributors road reserves that operate on a regional scale, and those of the other road types that operate on a local scale. The Primary Distributor road reserves fall under the jurisdiction of Main Roads WA whilst all other street types are subject to City of Wanneroo management and associated input from commercial and residential interests.

7.1 The Primary Distributor Planting strategy

In this instance the street tree planting strategy for Wanneroo Road will be determined on a case specific basis with recommended species identified in Figure 35.

7.2 Integrated Arterial Planting Strategy

Tree species for the Integrated Arterials will be determined on a case specific basis with recommended species identified in Figure 36.

Figure 35

Primary Distributor Recommended Street Tree Species

Street	Recommended Species
Wanneroo Road	<i>Angophora costata</i> , <i>Corymbia. citriodora</i> , <i>Corymbia maculata</i> , <i>Eucalyptus marginata</i>

Figure 36

Integrator Arterials Recommended Street Tree Species

Street	Recommended Species
Alexander Drive	<i>Eucalyptus grandis</i> , <i>Ficus hillii</i> (accent), <i>Callistemon</i> sp.
Beach Road	<i>Eucalyptus saligna</i> , <i>Agonis flexuosa</i>
Breakwater Drive <i>columnaris</i>	<i>Casuarina equisetifolia</i> , <i>Araucaria</i>
Connolly Drive	<i>Angophora costata</i> , <i>Agonis flexuosa</i>
Gnangara Road	<i>Eucalyptus botryoides</i>
Hepburn Avenue	<i>Eucalyptus botryoides</i> , <i>Agonis flexuosa</i>
Hester Avenue	<i>Casuarina cunninghamiana</i>
Joondalup Drive	<i>Corymbia maculata</i>
Lukin Drive	<i>Casuarina cunninghamiana</i>
Marangaroo Drive	<i>Casuarina cunninghamiana</i>
Marmion Avenue	<i>Casuarina equisetifolia</i>
Mirrabooka Avenue <i>cunninghamiana</i>	<i>Agonis flexuosa</i> <i>Casuarina</i>
Ocean Reef Road <i>flexuosa</i>	<i>Casuarina cunninghamiana</i> , <i>Agonis</i>
Pinjar Road	<i>Agonis flexuosa</i>
Two Rocks Road <i>gomphocephala</i>	<i>Agonis flexuosa</i> , <i>Eucalyptus</i>
Yanchep Beach Road	<i>Agonis flexuosa</i> , <i>Eucalyptus</i> <i>gomphocephala</i> , <i>Melaleuca lanceolata</i>

8.0 City of Wanneroo Master Street Tree Species List

8.1 Tree Selection Check List

Follow the procedure for selecting an appropriate street tree:

- STEP 1 Form an understanding of the City of Wanneroo guidelines for street tree planting by reading this document, *Nature Strip (verge) Treatment Guidelines and Landscape Requirements for Commercial Development* and the *Building Licence Applications Information Sheet*.
- STEP 2 Find the **location** where the planting will occur (refer to Figure 1, page 10).
- STEP 3 Identify the **Landscape Character Unit** that corresponds to the location (refer to Figure 32, page 37).
- STEP 4 Identify the **road type** (refer to Section 3, page 19).
Primary Disturbers and some Integrator Arterial roads have a recommended street tree species that must be followed (Refer to Section 7, page 41).
- STEP 5 Determine the **use** of the street tree within the streetscape (Refer to Section 4, page 24).
- STEP 6 Using the tree list for the specific Landscape Character Unit **choose a species** that is suitable for the Road Type. Be aware that some trees are intended for use in restricted circumstances and are noted as 'specific use trees', accompanied by a classification for their use.
- STEP 7 **Submit to the City of Wanneroo for approval** prior to planting:
 - street tree species selection,
 - A plan showing proposed tree locations, species, plant numbers and sizes.
 - And an irrigation plan showing isolation valve to the street trees

8.2 Coastal Landscape Tree Species

Australian Species

Road Types

IA - Integrator Arterial (Varies 25m -60m Reserve)

NC - Neighbourhood Connector (Typically 20/25m Reserve)

AS – Access Streets (Typically 16m Reserve)

* Denotes locally native species

Specific Tree Uses (SU)

BC- Buffer Combination species

FT- Feature Tree species

LM- Land Mark species

P – Suitable under power lines

POS- Public Open Space species

PS- Passive Solar species

RC- Retail and Commercial species

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
<i>Agonis flexuosa</i> 'After Dark'	Dark Leaf Peppermint	H: 6m W: 3-5m	●	●	●	●	BC	●
<i>Agonis flexuosa</i>	WA Peppermint	H: 10m W: 7m	●	●	●			●
<i>Allocasuarina fraseriana</i>	Common Sheoak	H: 15m W: 8m	●	●		●	BC/POS	Waterlogged soil tolerant
<i>Angophora costata</i>	Smooth Apple Gum	H: 15m W: 7m	●	●				
<i>Araucaria columnaris</i>	Cook's Pine	H: 30-50m W: 10-15m				●	LM	CoW approval required prior to planting
<i>Araucaria heterophylla</i>	Norfolk Island Pine	H: 30m W: 15m				●	LM	CoW approval required prior to planting
<i>Banksia littoralis</i>	Swamp Banksias	H: 8-12m W: 3-10m			●	●	POS	Suitable in remnant vegetation areas
<i>Callistemon</i> 'KPS'	Kings Park Special	H: 3-5m W: 3-4m	●	●	●	●	BC/FT/POS	●
<i>Callistemon viminalis</i>	Weeping Bottlebrush	H: 8m W: 4m	●	●	●	●	BC/POS	●
<i>Callitris preissii</i> *	Rottneest Island Cypress	H: 10-20m W: 5-8m	●			●	BC/POS	●
<i>Casuarina cunninghamiana</i>	River Sheoak	H: 20m W: 12m	●	●				Waterlogged soil tolerant Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas
<i>Casuarina equisetifolia</i>	Horsetail Sheoak	H: 9m W: 6m	●	●				● Salt wind tolerant Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas

Scientific name	Common name	Height & Spread	Road Types					P	Comments
			IA	NC	AS	SU			
<i>Eucalyptus botryoides</i>	Southern Mahogany	H: 12-30m W: 5-15m	●						
<i>Eucalyptus cladocalyx</i>	Sugar Gum	H: 12-15m W: 5-10m	●					Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas	
<i>Eucalyptus erethrocorys</i>	Illyarrie (tree form)	H: 7m W: 5m			●		●	Drought tolerant	
<i>Eucalyptus gomphocephala</i>	Tuart	H: 12-40m W: 5-15m	●	●		●	POS	Large woodland species suitable adjoining remnant vegetation	
<i>Eucalyptus lehmanni</i>	Bushy Yate	H: 6m W: 5m	●	●	●	●	BC	●	
<i>Eucalyptus leucoxylon</i> 'Rosea'	Yellow Gum	H: 10m W: 7m		●	●			●	
<i>Eucalyptus platypus heterophylla</i>	Coastal Moort	H: 4-8m W: 5-7m	●	●	●	●	BC	●	
<i>Eucalyptus platypus platypus</i>	Round Leaf Moort	H: 10m W: 8m	●	●	●	●	BC	●	
<i>Eucalyptus torquata</i>	Coral Gum	H: 5-10m W: 4-8m	●	●	●			● Drought tolerant	
<i>Ficus macrophylla</i>	Morton Bay Fig	H: 15-35m W: 15-25m				●	LM/POS	CoW approval required prior to planting	
<i>Ficus rubiginosa</i>	Port Jackson Fig	H: 25m W: 20m				●	LM/POS	CoW approval required prior to planting	
<i>Lagunaria patersonii</i>	Norfolk Is Hibiscus	H: 6m W: 3-5m		●	●	●	FT	● Seed pod contains irritating spines, roundabouts	
<i>Melaleuca ericifolia</i>	Swamp Paperbark	H: 4-8m W: 3-6m	●	●	●	●	BC		
<i>Melaleuca lanceolata</i> *	Rottnest Island Tea Tree	H: 6m W: 5m	●	●	●	●	POS	● Salt tolerant	
<i>Melaleuca quinquenervia</i>	Broad Leaf Paperbark	H: 10m W: 8m	●	●				Waterlogged soil tolerant	

Exotic Species
CoW approval required prior to planting

Road Types

IA - Integrator Arterial (Varies 25m -60m Reserve)
 NC - Neighbourhood Connector (Typically 20/25m Reserve)
 AS – Access Streets (Typically 16m Reserve)

Specific Tree Uses (SU)

BC- Buffer Combination species
 FT- Feature Tree species
 LM- Land Mark species

P – Suitable under power lines
 POS- Public Open Space species
 PS- Passive Solar species
 RC- Retail and Commercial species

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
Erythrina sykesii	Coral Tree	H: 15m W: 12m				●	FT/PS/RC	Deciduous, red flowers in late winter
Metrosideros excelsus	NZ Christmas Tree	H: 8m W: 6m		●	●	●	FT/PS/RC	● Salt tolerant
Olea europaea	Olive	H: 7m W: 5m				●	FT/POS	● Evergreen, suitable for roundabouts, cultural significance Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
Phoenix canariensis	Canary Is Date Palm	H: 15m W: 9m				●	FT	Large palm

8.3 Dunes Landscape Tree Species

Australian Species

Road Types

IA - Integrator Arterial (Varies 25m -60m Reserve)

NC - Neighbourhood Connector (Typically 20/25m Reserve)

AS – Access Streets (Typically 16m Reserve)

* Denotes locally native species

Specific Tree Uses (SU)

BC- Buffer Combination species

FT- Feature Tree species

LM- Land Mark species

P – Suitable under power lines

POS- Public Open Space species

PS- Passive Solar species

RC- Retail and Commercial species

Scientific name	Common name	Height & Spread	Road Types				P	Comments	
			IA	NC	AS	SU			
<i>Acmena smithii</i>	Lilly Pilly	H: 8m W: 5m		●				CoW approval required prior to planting	
<i>Agonis flexuosa</i> 'After Dark'	Dark Leaf Peppermint	H: 6m W: 3-5m	●	●	●	●	BC	●	
<i>Agonis flexuosa</i>	WA Peppermint	H: 10m W: 7m	●	●	●			●	
<i>Allocasuarina fraseriana</i> *	Common Sheoak	H: 15m W: 8m	●	●		●	POS		Waterlogged soil tolerant
<i>Angophora costata</i>	Smooth Barked Apple Gum	H: 15m W: 7m	●	●					
<i>Banksia attenuata</i> *	Candle Banksia	H: 4-12m W: 3-8m			●	●	POS	●	Suitable in remnant vegetation areas
<i>Banksia grandis</i> *	Bull Banksia	H: 8m W: 5m			●	●	POS	●	Suitable in remnant vegetation areas
<i>Banksia ilicifolia</i>	Holly-Leaf Banksia	H: 10m W: 8m			●	●	POS	●	
<i>Banksia menziesii</i> *	Firewood Banksia	H: 10m W: 8m			●	●	POS	●	Suitable in remnant vegetation areas
<i>Banksia prionotes</i>	Saw-toothed Banksia	H: 5-10m W: 3-5m			●	●	POS	●	
<i>Brachychiton acerfolius</i>	Illawarra Flame Tree	H: 30m W: 15m		●		●	FT/RC		CoW approval required prior to planting

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
Brachychiton populensis	Kurrajong	H: 20m W: 15m		●		●	FT/POS	CoW approval required prior to planting
Callistemon 'KPS'	Kings Park Special	H: 3-5m W: 3-4m	●	●	●	●	BC/FT/POS	●
Callistemon viminalis	Weeping Bottlebrush	H: 8m W: 4m	●	●	●	●	BC/POS	●
Callitris preissii	Rottneest Island Cypress	H: 10-20m W: 5-8m	●			●	BC/POS	●
Casuarina cunninghamiana	River Sheoak	H: 20m W: 12m	●	●				Waterlogged soil tolerant Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas
Corymbia citriodora	Lemon Scented Gum	H: 30m W: 15m	●			●	FT	Tall tree Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
Corymbia ficifolia	Red Flowering Gum	H: 8-12m W: 4-6m	●	●	●			
Corymbia maculata	Spotted Gum	H: 30m W: 15m	●	●				Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
Eucalyptus botryoides	Southern Mahogany	H: 12-30m W: 5-15m	●					
Eucalyptus cladocalyx	Sugar Gum	H: 12-15m W: 5-10m	●					Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
Eucalyptus decipiens*	Limestone Mallet	H: 3-10m W: 3-5m			●	●	POS	Suitable in remnant vegetation areas only
Eucalyptus erethrocorys	Illyarrie (tree form)	H: 7m W: 5m				●	BC/POS	● Drought tolerant
Eucalyptus erythronema	Red Flowered Mallee	H: 4-9m W: 4-7m			●	●	BC	●

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
<i>Eucalyptus gomphocephala</i> *	Tuart	H: 12-40m W: 5-15m	●	●		●	POS	Suitable in remnant vegetation area
<i>Eucalyptus lehmanni</i>	Bushy Yate	H: 6m W: 5m	●	●	●	●	BC	●
<i>Eucalyptus leucoxyton</i> 'Rosea'	Yellow Gum	H: 10m W: 7m		●	●			●
<i>Eucalyptus marginata</i> *	Jarrah	H: 10-35m W: 6-25m	●	●		●	POS	Suitable in remnant vegetation areas
<i>Eucalyptus melliodora</i>	Yellow Box	H: 20 W: 8-10	●	●			POS	
<i>Eucalyptus nicholli</i>	Willow Leaf Peppermint	H: 15m W: 12m	●	●				Fast growing
<i>Eucalyptus occidentalis</i>	Swamp Mallet	H: 15-25m W: 8-12m	●	●	●			
<i>Eucalyptus platypus heterophylla</i>	Coastal Moort	H: 4-8m W: 5-7m	●	●	●	●	BC	●
<i>Eucalyptus platypus platypus</i>	Round Leafed Moort	H: 10m W: 8m	●	●	●	●	BC	●
<i>Eucalyptus saligna</i>	Sydney Blue Gum	H: 15-30m W: 10-15m	●					Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
<i>Eucalyptus scoparia</i>	Wallangarra White Gum	H: 8-12m W: 6-10m	●	●	●			● Shade tree
<i>Eucalyptus sideroxylon</i> 'Rosea'	Red Ironbark Gum	H: 10-30m W: 5-15m	●	●				
<i>Eucalyptus spathulata</i>	Swamp Mallee	H: 6-10m W: 8m	●	●	●			● Water tolerant, suitable for heavy soils
<i>Eucalyptus todtiana</i>	Pricklybark	H: 5-15m W: 5-10m			●	●	POS	●
<i>Eucalyptus torquata</i>	Coral Gum	H: 5-10m W: 4-8m	●	●				● Drought tolerant

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
Eucalyptus 'Torwood'	Hybrid Coral Gum	H: 5-8 W: 6-8			●		BC	
Eucalyptus woodwardii	Lemon Flowered Gum	H: 12m W: 8m	●	●	●			
Ficus hillii	Hill's Fig	H: 12m W: 10m				●	FT/POS	Evergreen, roundabouts
Ficus macrophylla	Morton Bay Fig	H: 15-35m W: 15-25m				●	LM/POS	CoW approval required prior to planting
Ficus rubiginosa	Port Jackson Fig	H: 25m W: 20m				●	LM/POS	CoW approval required prior to planting
Hymenosporum flavum	Native Frangipani	H: 8m W: 5m		●	●	●	FT	Suitable in roundabouts
Lagunaria patersonii	Norfolk Is Hibiscus	H: 6m W: 3-5m		●	●	●	FT	● Seed pod contains irritating spines, suitable in roundabouts Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas
Lophostemon confertus	Queensland Brush Box	H: 15m W: 12m		●	●	●	FT	Suitable in roundabouts
Melaleuca ericifolia	Swamp Paperbark	H: 4-8m W: 3-6m	●	●	●	●	BC	
Melaleuca lanceolata	Rottneest Is Tea Tree	H: 6m W: 5m	●	●	●	●	POS	● Salt tolerant, suitable in roundabouts
Melaleuca quinquenervia	Broad Leaf Paperbark	H: 10m W: 8m	●	●				Waterlogged soil tolerant
Podocarpus elatus	Illawarra Plum	H: 15-30m W: 10-15m		●		●	FT	Suitable in roundabouts

Exotic Species

CoW approval required prior to planting

Road Types

IA - Integrator Arterial (Varies 25m -60m Reserve)

NC - Neighbourhood Connector (Typically 20/25m Reserve)

AS - Access Streets (Typically 16m Reserve)

Specific Tree Uses (SU)

BC- Buffer Combination species

FT- Feature Tree species

LM- Land Mark species

P – Suitable under power lines

POS- Public Open Space species

PS- Passive Solar species

RC- Retail and Commercial species

Scientific name	Common name	Height & Spread	Road Types					P	Comments
			IA	NC	AS	SU			
Acer negundo	Box Elder	H: 10m W: 8m				●	FT/PS /RC	Deciduous	
Acer saccharum	Sugar Maple	H: 10-15m W: 8-10m				●	FT/RC	Deciduous	
Alnus cordata	Italian Alder	H: 9m W: 7m				●	FT/RC	● Deciduous, Waterlogged soil tolerant	
Bauhinia variegata	Orchid Tree	H: 8 W: 6m				●	FT/PS /RC	●	
Caesalpinia ferrea	Brazilian Ironwood	H: 12m W: 10m				●	PS/RC	Fast growing, requires formative pruning	
Erythrina sykesii	Coral Tree	H: 15m W: 12m				●	FT/PS/RC	Deciduous, red flowers in late winter	
Fraxinus excelsior	Golden Ash	H: 15m W: 12m				●	PS/RC		
Fraxinus excelsior 'Aurea'	European Ash	H: 15m W: 12m				●	PS/RC	Deciduous	
Fraxinus griffithii	Evergreen Ash	H: 6m W: 4m				●	FT/RC	● Suitable for roundabouts	
Fraxinus oxycarpa 'Raywood'	Claret Ash	H: 15m W: 12m				●	PS/RC	Deciduous	
Gleditsia tricanthos cultivars	Honey Locust	H: 25m W: 20m				●	PS/RC	Deciduous shade tree Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas	
Ginko biloba	Maiden Hair Tree	H: 10 W: 5m				●	FT/POS	●	
Harpephyllum caffrum	Kaffir Plum	H: 12m W: 15m				●	FT	Fruiting tree, suitable for roundabouts	

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
Jacaranda mimosifolia	Jacaranda	H: 15m W: 12m				●	PS/RC	Deciduous, purple flower in spring
Lagerstroemia indica	Crepe Myrtle	H: 7m W: 5m				●	FT/PS/ RC	● Deciduous
Liquidambar styraciflua	Liquidambar/Sweet Gum	H: 25m W: 12m				●	POS	CoW approval required prior to planting
Magnolia grandiflora	Southern Magnolia	H: 10m W: 8m				●	FT/POS	● Evergreen, suitable for roundabouts
Olea europaea	Olive	H: 7m W: 5m				●	FT/POS	● Evergreen, suitable for roundabouts, cultural significance Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
Phoenix canariensis	Canary Island Date Palm	H: 15m W: 9m				●	FT	Large palm, suitable for roundabouts
Platanus acerfolia	London Plane	H: 18-24m W: 10-15m				●	PS/ RC	Deciduous, will require root barriers Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas
Platanus orientalis	Oriental Plane	H: 25m W: 25m				●	PS / RC	Deciduous, will require root barriers
Prunus x blireana	Double Flowering Plum	H: 4-6m W: 4-6m				●	FT	● Deciduous
Pyrus calleryana	Callery Pear	Various				●	FT/PS	Deciduous
Pyrus ussuriensis	Manchurian Pear	H: 8-15m W: 8-12m				●	PS / RC	Deciduous
Sapium sebiferum	Chinese Tallow	H: 10m W: 8m				●	PS /RC	Deciduous
Tipuana tipu	Tipuana	H: 10-15m W: 10m				●	FT/PS /RC	Deciduous shade tree
Ulmus parvifolia	Chinese Elm	H: 10m W: 9m				●	RC	Semi evergreen, suitable for roundabouts

8.4 Lakes Landscape Tree Species

Australian Species

Road Types

IA - Integrator Arterial (Varies 25m -60m Reserve)

NC - Neighbourhood Connector (Typically 20/25m Reserve)

AS – Access Streets (Typically 16m Reserve)

* Denotes locally native species

Specific Tree Uses (SU)

BC- Buffer Combination species

FT- Feature Tree species

LM- Land Mark species

P – Suitable under power lines

POS- Public Open Space species

PS- Passive Solar species

RC- Retail and Commercial species

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			I A	N C	A S	S U		
							*	
<i>Agonis flexuosa</i> 'After Dark'	Dark Leaf Peppermint	H: 6m W: 3-5m	●	●	●	●	BC	●
<i>Agonis flexuosa</i>	WA Peppermint	H: 10m W: 7m	●	●	●			●
<i>Allocasuarina fraseriana</i>	Common sheoak	H: 15m W: 8m	●	●		●	POS	Waterlogged soil tolerant
<i>Banksia grandis</i> *	Bull Banksia	H: 8m W: 5m				●	POS	● Suitable in remnant vegetation areas
<i>Banksia ilicifolia</i> *	Holly-Leaf Banksia	H: 10m W: 8m			●	●	POS	● Suitable in remnant vegetation areas
<i>Banksia littoralis</i> *	Swamp Banksia	H: 8-12m W: 3-10m			●	●	POS	● Suitable in remnant vegetation areas
<i>Banksia menziesii</i> *	Firewood Banksia	H: 10m W: 8m				●	POS	● Suitable in remnant vegetation areas
<i>Callistemon</i> 'KPS'	Kings Park Special	H: 3-5m W: 3-4m	●	●	●	●	BC/FT/POS	●
<i>Callistemon viminalis</i>	Weeping Bottlebrush	H: 8m W: 4m	●	●	●	●	BC/POS	●
<i>Casuarina cunninghamiana</i>	River Sheoak	H: 20m W: 12m	●	●				Waterlogged soil tolerant Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas

Scientific name	Common name	Height & Spread	Road Types				P	Comments	
			IA	NC	AS	SU			
<i>Casuarina equisetifolia</i>	Horsetail Sheoak	H: 9m W: 6m	●	●				Salt wind tolerant Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas	
<i>Casuarina obesa</i>	Swamp Sheoak	H: 10m W: 4m	●	●		●	POS	●	Prefers wet soil
<i>Corymbia maculata</i>	Spotted Gum	H: 30m W: 15m	●	●					Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
<i>Eucalyptus botryoides</i>	Southern Mahogany	H: 12-30m W: 5-15m	●						Identified and rated as a 'mild' potential weed by CALM, avoid planting near bushland areas
<i>Eucalyptus gomphocephala</i> *	Tuart	H: 12-40m W: 5-15m	●	●		●	POS		Large woodland species suitable adjoining remnant vegetation
<i>Eucalyptus lehmanni</i>	Bushy Yate	H: 6m W: 5m	●	●	●	●	BC	●	
<i>Eucalyptus leucoxylon</i> 'Rosea'	Yellow Gum	H: 10m W: 7m		●	●				
<i>Eucalyptus marginata</i> *	Jarra	H:10-35m W: 6-25m	●	●		●	POS		Suitable adjoining remnant vegetation
<i>Eucalyptus nicholli</i>	Willow Leaf Peppermint	H: 15m W: 12m	●	●					Fast growing
<i>Eucalyptus occidentalis</i>	Swamp Mallet	H: 15-25m W: 8-12m	●	●	●				
<i>Eucalyptus platypus</i> <i>platypus</i>	Round Leafed Moort	H: 10m W: 8m	●	●	●	●	BC	●	Low tree not suitable for close proximity to verge

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
<i>Eucalyptus rudis</i> *	Flooded Gum	H: 10- 20m W: 5-10m	●	●		●	POS	Wetland species, waterlogged soil tolerant
<i>Eucalyptus saligna</i>	Sydney Blue Gum	H: 15-30m W: 10-15m	●					Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas
<i>Eucalyptus sideroxylon</i> 'Rosea'	Red Ironbark Gum	H: 10-30m W: 5-15m	●	●				
<i>Eucalyptus spathulata</i>	Swamp Mallee	H: 6-10m W: 8m	●	●	●		●	Water tolerant, suitable for heavy soils
<i>Eucalyptus woodwardii</i>	Lemon Flowered Gum	H: 12m W: 8m	●	●	●			
<i>Hymenosporum flavum</i>	Native Frangipani	H: 8m W: 5m		●	●	●	FT	Suitable in roundabouts
<i>Lophostemon confertus</i>	Queensland Brush Box	H: 15m W: 12m		●	●	●	FT	Suitable in roundabouts
<i>Melaleuca leucadendron</i>	Weeping Paperbark	H: 12m W: 6m	●	●	●	●	FT	Waterlogged soil tolerant, suitable in roundabouts
<i>Melaleuca linariifolia</i>	Flax Leafed Paperbark	H: 8m W: 6m		●	●	●	FT	Profuse flowering from late spring to summer
<i>Melaleuca preissiana</i> *	Modong	H: 6-10 W: 3-5m	●	●		●	POS	● Waterlogged soil tolerant
<i>Melaleuca quinquenervia</i>	Broad Leaf Paperbark	H: 10m W: 8m	●	●				Waterlogged soil tolerant
<i>Melaleuca raphiophylla</i> *	Moonah	H: 7-10 W: 4-6m	●	●	●	●	POS	● Waterlogged soil tolerant
<i>Podocarpus elatus</i>	Illawarra Plum	H: 15-30m W: 10-15m		●		●	FT	Suitable in roundabouts

8.5 Eastern Plains Landscape Tree Species

Australian Species

Road Types

IA - Integrator Arterial (Varies 25m -60m Reserve)

NC - Neighbourhood Connector (Typically 20/25m Reserve)

AS – Access Streets (Typically 16m Reserve)

* Denotes locally native species

Specific Tree Uses (SU)

BC- Buffer Combination species

FT- Feature Tree species

LM- Land Mark species

P – Suitable under power lines

POS- Public Open Space species

PS- Passive Solar species

RC- Retail and Commercial species

Scientific name	Common name	Height & Spread	Road Types				P	Comments	
			IA	NC	AS	SU			
<i>Agonis flexuosa</i> 'After Dark'	Dark Leaf Peppermint	H: 6m W: 3-5m	●	●	●	●	BC	●	
<i>Agonis flexuosa</i>	WA Peppermint	H: 10m W: 7m	●	●	●				
<i>Allocasuarina fraseriana</i>	Common Sheoak	H: 15m W: 8m	●	●		●	POS		Waterlogged soil tolerant
<i>Angophora costata</i>	Smooth Barked Apple Gum	H: 15m W: 7m	●	●					
<i>Araucaria cunninghamii</i>	Hoop Pine	H: 30m W: 10m				●	LM		CoW approval required prior to planting
<i>Banksia grandis</i>	Bull Banksia	H: 8m W: 5m			●	●	POS	●	Suitable in remnant vegetation areas
<i>Banksia menziesii</i> *	Firewood Banksia	H: 10m W: 8m			●	●	POS	●	Suitable in remnant vegetation areas
<i>Brachychiton acerfolius</i>	Illawarra Flame Tree	H: 30m W: 15m		●		●	FT/RC		CoW approval required prior to planting
<i>Brachychiton gregorii</i>	Desert Kurrajong	H: 4-8 W: 2-4		●	●				CoW approval required prior to planting
<i>Brachychiton populneus</i>	Kurrajong	H: 20m W: 15m		●		●	FT/ POS		CoW approval required prior to planting
<i>Callistemon</i> 'KPS'	Kings Park Special	H: 3-5m W: 3-4m	●	●	●	●	BC/FT/POS	●	
<i>Callistemon viminalis</i>	Weeping Bottlebrush	H: 8m W: 4m	●	●	●	●	BC/POS	●	

Scientific name	Common name	Height & Spread	Road Types				P	Comments	
			IA	NC	AS	SU			
Casuarina cunninghamiana	River Sheoak	H: 20m W: 12m	●	●				Waterlogged soil tolerant Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas	
Casuarina obesa	Swamp Sheoak	H: 10m W: 4m	●	●		●	POS	● Prefers wet soil	
Corymbia citriodora	Lemon Scented Gum	H: 30m W: 15m	●			●	FT		Tall tree Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
Corymbia ficifolia	Red Flowering Gum	H: 8-12m W: 4-6m	●	●	●				
Corymbia maculata	Spotted Gum	H: 30m W: 15m	●	●					Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
Eucalyptus botryoides	Southern Mahogany	H: 12-30m W: 5-15m	●						Identified and rated as a 'mild' potential weed by CALM, avoid planting near bushland areas
Eucalyptus cladocalyx	Sugar Gum	H: 12-15m W: 5-10m	●						Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
Eucalyptus erethrocorys	Illyarrie (tree form)	H: 7m W: 5m			●			●	Drought tolerant
Eucalyptus erythronema	Red Flowered Mallee	H: 4-9m W: 4-7m			●	●	BC	●	
Eucalyptus gomphocephala	Tuart	H: 12-40m W: 5-15m	●	●		●	POS		Large woodland species suitable adjoining remnant vegetation
Eucalyptus lehmanni	Bushy Yate	H: 6m W: 5m	●	●	●	●	BC	●	
Eucalyptus marginata*	Jarra	H: 10-35m W: 6-25m	●	●		●	POS		Woodland species suitable adjoining remnant vegetation

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
<i>Eucalyptus leucoxylo</i> 'Rosea'	Yellow Gum	H: 10m W: 7m		●	●		●	
<i>Eucalyptus melliodora</i>	Yellow Box	H: 20 W: 8-10	●	●			POS	
<i>Eucalyptus nicholli</i>	Willow Leaf Peppermint	H: 15m W: 12m	●	●				Fast growing
<i>Eucalyptus occidentalis</i>	Swamp Mallet	H: 15-25m W: 8-12m	●	●	●			
<i>Eucalyptus saligna</i>	Sydney Blue Gum	H: 15-30m W: 10-15m	●					Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas
<i>Eucalyptus scoparia</i>	Wallangarra White Gum	H: 8-12m W: 6-10m	●	●	●			Shade tree
<i>Eucalyptus sideroxylon</i> 'Rosea'	Red Ironbark gum	H: 10-30m W: 5-15m	●	●				
<i>Eucalyptus</i> 'Torwood'	Hybrid Coral Gum	H: 5-8 W: 6-8			●		BC	
<i>Eucalyptus torquata</i>	Coral Gum	H: 5-10m W: 4-8m	●	●	●		●	Drought tolerant
<i>Eucalyptus woodwardii</i>	Lemon Flowered Gum	H: 12m W: 8m	●	●	●			
<i>Ficus hillii</i>	Hill's Fig	H: 12m W: 10m				●	POS	Evergreen
<i>Ficus macrophylla</i>	Morton Bay Fig	H: 15-35m W: 15-25m				●	LM/POS	CoW approval required prior to planting
<i>Ficus rubiginosa</i>	Port Jackson Fig	H: 25m W: 20m				●	LM/POS	CoW approval required prior to planting
<i>Hymenosporum flavum</i>	Native Frangipani	H: 8m W: 5m		●	●	●	FT	Suitable in roundabouts
<i>Lophostemon confertus</i>	Queensland Brush Box	H: 15m W: 12m		●	●	●	FT	

Scientific name	Common name	Height & Spread	Road Types					P	Comments
Melaleuca ericifolia	Swamp Paperbark	H: 4-8m W: 3-6m	●	●	●	●	BC		
Melaleuca leucadendron	Weeping Paperbark	H: 12m W: 6m	●	●	●	●	FT		Waterlogged soil tolerant, suitable in roundabouts
Melaleuca linariifolia	Flax Leafed Paperbark	H: 8m W: 6m		●	●	●	FT		Profuse flowering from late spring to summer
Melaleuca preissiana	Modong	H: 6-10 W: 3-5m	●	●		●	POS		Waterlogged soil tolerant
Melaleuca quinquenervia	Broad Leaf Paperbark	H: 10m W: 8m	●	●					Waterlogged soil tolerant
Melaleuca raphiophylla	Moonah	H: 7-10 W: 4-6m	●	●	●	●	POS	●	Waterlogged soil tolerant
Podocarpus elatus	Illawarra Plum	H: 15-30m W: 10-15m		●		●	FT		Suitable in roundabouts

Exotic Species

CoW approval required prior to planting

Road Types

IA - Integrator Arterial (Varies 25m -60m Reserve)

NC - Neighbourhood Connector (Typically 20/25m Reserve)

AS – Access Streets (Typically 16m Reserve)

Specific Tree Uses (SU)

BC- Buffer Combination species

FT- Feature Tree species

LM- Land Mark species

P – Suitable under power lines

POS- Public Open Space species

PS- Passive Solar species

RC- Retail and Commercial species

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
Acer negundo	Box Elder	H: 10m W: 8m				●	FT/PS /RC	Deciduous
Acer saccharum	Sugar Maple	H: 10-15m W: 8-10m				●	FT/RC	Deciduous
Alnus cordata	Italian Alder	H: 9m W: 7m				●	FT/RC	Deciduous, Waterlogged soil tolerant
Bauhinia variegata	Orchid Tree	H: 8 W: 6m				●	FT/PS/RC	●
Caesalpinia ferrea	Brazilian Ironwood	H: 12m W: 10m				●	PS/RC	Fast growing, requires formative pruning
Erythrina sykesii	Coral Tree	H: 15m W: 12m				●	FT/PS/RC	Deciduous, red flowers in late winter
Fraxinus excelsior	Golden Ash	H: 15m W: 12m				●	PS/RC	Deciduous
Fraxinus excelsior 'Aurea'	European Ash	H: 15m W: 12m				●	POS/PS/RC	Deciduous
Fraxinus griffithii	Evergreen Ash	H: 6m W: 4m				●	FT/RC	● Prefers deep soil
Fraxinus oxycarpa 'Raywood'	Claret Ash	H: 15m W: 12m				●	PS/RC	Deciduous

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
Gleditsia tricanthos+cultivars	Honey Locust	H: 25m W: 20m				●	PS/RC	Deciduous shade tree Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
Ginko biloba	Maiden Hair Tree	H: 10m W: 5m				●	FT/POS	●
Harpephyllum caffrum	Kaffir plum	H: 12m W: 15m				●	FT	Fruiting tree, suitable for roundabouts
Jacaranda mimosifolia	Jacaranda	H: 15m W: 12m				●	FT/PS/ RC	Deciduous, purple flower in spring
Lagerstroemia indica	Crepe myrtle	H: 7m W: 5m				●	FT/PS/ RC	● Deciduous
Liquidambar styraciflua	Liquidambar/Sweet Gum	H: 25m W: 12m				●	POS	CoW approval required prior to planting
Magnolia grandiflora	Southern magnolia	H: 10m W: 8m				●	FT/POS	Evergreen, suitable for roundabouts
Olea europaea	Olive	H: 7m W: 5m				●	FT/POS	Evergreen, suitable for roundabouts, cultural significance Identified and rated as a 'moderate' potential weed by CALM, avoid planting near bushland areas
Phoenix canariensis	Canary Island Date Palm	H: 15m W: 9m				●	FT	Large palm
Platanus acerfolia	London Plane	H: 18-24m W: 10-15m				●	PS/ RC	Deciduous, will require root barriers Identified and rated as a 'low' potential weed by CALM, avoid planting near bushland areas
Platanus orientalis	Oriental Plane	H: 25m W: 25m				●	PS / RC	Deciduous, will require root barriers
Prunus x blireana	Double Flowering Plum	H: 4-6m W: 4-6m				●	FT	● Deciduous
Pyrus calleryana	Callery Pear	Various				●	FT/PS	Deciduous
Pyrus ussuriensis	Manchurian Pear	H: 8-15m W: 8-12m				●	FT/PS/ RC	Deciduous

Scientific name	Common name	Height & Spread	Road Types				P	Comments
			IA	NC	AS	SU		
Quercus palustris	Pin Oak	H: 10-15m W: 8-10m				●	PS /RC	Deciduous
Quercus robur	English Oak	H: 18m W: 15m				●	FT/POS	Deciduous
Sapium sebiferum	Chinese tallow	H: 10m W: 8m				●	PS /RC	Deciduous
Tipuana tipu	Tipuana	H: 10-15m W: 10m				●	PS /FT	Deciduous shade tree
Ulmus parvifolia	Chinese elm	H: 10m W: 9m				●	FT/PS /RC	Semi evergreen, suitable for roundabouts

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10.0 Appendix A Metropolitan Functional Road Hierarchy Road Types and Criteria

ROAD TYPES						
	CRITERIA & ACTIVITY	PRIMARY DISTRIBUTER	DISTRICT DISTRIBUTOR CATEGORY "A"	DISTRICT DISTRIBUTOR CATEGORY "B"	LOCAL DISTRIBUTER	ACCESS ROAD
1	Predominant Activity	Major networks eg freeways	Important network	Less important network	Minor network	Limited access to traffic. Forms part of local distribution network
2	Intersections	Controlled with appropriate measures eg grade separation, high speed traffic management measures	Controlled with appropriate measures eg traffic signals	Controlled with appropriated Local Area Traffic Management	Controlled with minor Local Area Traffic Management	Self controlling with minor measures
3	Indicative Traffic Volume (except semi-rural areas)	Above 15 000 vehicles per day	Above 8000 vehicles per day	Above 6000 vehicles per day	Maximum desirable volume 6000 vehicles per day	Maximum desirable volume 3000 vehicles per day
4	Frontage Access Allowed	None on Controlled Access Highways Limited on other routes	Prefer not to have residential access and limited commercial Generally via service roads	Residential and commercial access due to its historic status Prefer to limit when and where possible	Yes, except at intersections where side entry is preferred and traffic signals are involved	Yes
5	Pedestrians Allowed	Preferably none at grade Crossing should be controlled	With positive measures for control and safety eg pedestrian signals	With appropriate measures for control and safety eg median/islands/refuges	With minor safety measures	Yes
6	Recommended Operating Speed	60 – 100km/hr (depending on design characteristics)	60-70 km/h	60km/h	60km/h	40-60km/h (desired speed)
7	Buses Allowed	Yes	Yes	Yes	Yes	If required
8	Parking Allowed	No	Generally no Clearways where necessary	Not preferred Clearways where necessary	Yes	Yes
9	Truck Routes	Yes	Yes	Yes	Only to service properties	Only to service properties
10	Responsibility	MRWA	Local Government	Local Government	Local Government	Local Government

Ideally, every road should meet all the criteria of one FRH type.

However, many roads meet some of the criteria appropriate to different road functional types and are difficult to define.

Where precise definition of the functional type is difficult, comparison with road of similar function in other Local Government areas may assist.

11.0 Appendix B CALM Environmental Weed Strategy for WA Appendix 3:

Environmental Weed Strategy for WA; Appendix 3, CALM

List of Environmental Weed Species of Actual and Potential Significance in WA

In developing the Environmental Weed Strategy for WA, criteria for the assessment and rating of weeds in terms of their environmental impact on biodiversity were formulated. Criteria for assessing a weed are:

- **Invasiveness** ability to invade bushland in good to excellent condition or ability to invade waterways.
- **Distribution** – wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world.
- **Environmental Impacts** – ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community.

The rating of each weed was to be determined by the following scoring system:

- **High** - a weed species would have to score yes for all three criteria. Rating a weed species as high would indicate prioritising this weed for control and/or research ie prioritising funding to it. Trees that fall into this category include:

Leptospermum laevigatum

- **Moderate** -a weed species would have to score yes for two of the above criteria. Rating a weed species as moderate would indicate that control or research effort should be directed to it if funds are available, however it should be monitored (possibly a reasonably high level of monitoring). Trees that fall into this category include:

Eucalyptus citriodora Eucalyptus cladocalyx Eucalyptus maculata	Ficus carica Olea europaea	Pinus pinaster Pinus radiata
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- **Mild** – a weed species scoring one of the criteria. A mild rating would indicate monitoring of the week and control where appropriate. Trees that fall into this category include:

Eucalyptus botryoides	Washingtonia filifera	
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- **Low** – a weed species would score none of the criteria. A low ranking would mean that this species would require a low level of monitoring. Trees that fall into this category include:

Acacia baileyana	Eucalyptus muelleriana	Pinus halepensis
Cassia fistula	Eucalyptus	Pinus pinea
Casuarina	polyanthemus	Platanus x acerifolia
cunninghamiana	Eucalyptus saligna	Populus alba
Casuarina equisetifolia	Gleditsia triacanthos	Populus nigra
Casuarina glauca	Grevillea robusta	Salix babylonica
Eucalyptus globules	Lagunaria patersonii	Tamarindus indica
	Mangifera indica	Ulmus procera
	Pinus canariensis	

12.0 Appendix C List of Common Names in Alphabetical Order

A	Coolgardie Gum - <i>Eucalyptus torquata</i>
Acorn Banksia - <i>Banksia prionotes</i>	Coolgardie Rose - <i>Eucalyptus torquata</i>
B	Coral Gum - <i>Eucalyptus torquata</i>
Bangalay - <i>Eucalyptus botroides</i>	Coral Tree – <i>Erythrina x sykesii</i> syn <i>Erythrina indica</i>
Box Elder – <i>Acer negundo</i>	Crepe Myrtle – <i>Lagerstroemia indica</i>
Brazilian Ironwood – <i>Caesalpinia ferrea</i>	Crimson-Flowerd Eucalyptus - <i>Corymbia ficifolia</i> syn <i>Eucalyptus ficifolia</i>
Broad Leaved Paperbark - <i>Melaleuca quinquenervia</i>	D
Brown Pine Plum - <i>Podocarpus elatus</i>	Dark Leaf Peppermint – <i>Agonis flexuosa</i> ‘After Dark’
Bull Banksia – <i>Banksia grandis</i>	Desert Kurrajong – <i>Brachychiton gregorii</i>
Bullbay Magnolia - <i>Magnolia grandiflora</i>	Double Flowering Plum – <i>Prunus x blireana</i>
Bushy Yate - <i>Eucalyptus lehmanni</i>	E
C	English Oak – <i>Quercus robur</i>
Callery Pear – <i>Pyrus calleryana</i>	European Ash - <i>Fraxinus excelsior</i>
Canary Island Date Palm – <i>Phoenix canariensis</i>	Evergreen Ash - <i>Fraxinus griffithii</i>
Candle Banksia – <i>Banksia attenuata</i>	F
Chinese Elm – <i>Ulmus parvifolia</i>	Firewood Banksia – <i>Banksia menziesii</i>
Chinese Tallow – <i>Sapium sebiferum</i>	Flat-topped Yate - <i>Eucalyptus occidentalis</i>
Claret Ash - <i>Fraxinus oxycarpa</i> ‘Raywood’	Flax Leaved Paperbark - <i>Melaleuca linarifolia</i>
Coastal Blackbutt - <i>Eucalyptus todtiana</i>	Flooded Gum - <i>Eucalyptus rudis</i>
Coastal Moort - <i>Eucalyptus platypus heterophylla</i>	Flowering Ash - <i>Fraxinus griffithii</i>
Coastal Sheoak – <i>Casuarina equisetifolia</i>	Flowering Ornamental Pear - <i>Pyrus calleryana</i>
Coast Banksia - <i>Banksia attenuata</i>	Freshwater Paperbark - <i>Melaleuca raphiophylla</i>
Cajeput Tree - <i>Melaleuca leucadendron</i>	G
Common Ash - <i>Fraxinus excelsior</i>	Golden Ash – <i>Fraxinus excelsior</i> ‘Aurea’
Common Sheoak – <i>Allocasuarina fraseriana</i>	H
Cook’s Pine – <i>Araucaria columnaris</i>	Hill’s Weeping Fig – <i>Ficus hillii</i>

Holly-Leaf Banksia – <i>Banksia illicifolia</i>	M
Honey Locust – <i>Gleditsia tricanthus</i>	Maiden Hair Tree – <i>Ginko biloba</i>
Honey Scented Eucalyptus – <i>Eucalyptus melliodora</i>	Manchurian Pear – <i>Pyrus ussuriensis</i>
Hoop Pine – <i>Araucaria cunninghamii</i>	Menzies Banksia - <i>Banksia menziesii</i>
Horsetail Sheoak – <i>Casuarina equisetifolia</i>	Modong - <i>Melaleuca preissiana</i>
Hybrid Coral Gum – <i>Eucalyptus ‘Torwood’</i>	Moonah - <i>Melaleuca lanceolata</i>
I	Moonah - <i>Melaleuca raphiophylla</i>
Illawarra Flame Tree – <i>Brachychiton acerfolius</i>	Moort - <i>Eucalyptus platypus platypus</i>
Illawara Plum – <i>Podocarpus elatus</i>	Moreton Bay Fig - <i>Ficua macrophylla</i>
Illyarrie - <i>Eucalyptus erethrocorys</i>	N
Indian Summer - <i>Lagerstroemia indica</i>	Narrow Leaved Black Peppermint - <i>Eucalyptus nicholii</i>
Italian Alder – <i>Alnus cordata</i>	Native Fragipani – <i>Hymenosporum flavum</i>
J	New Zealand Christmas Tree – <i>Metrosideros excelsus</i>
Jacaranda – <i>Jacaranda mimosifolia</i>	Norfolk Island Hibiscus – <i>Lagunaria patersonii</i>
Jarraah - <i>Eucalyptus marginata</i>	Norfolk Island Pine – <i>Araucaria heterophylla</i>
K	O
Kaffir Plum – <i>Harpephyllum caffrum</i>	Olive – <i>Olea europea</i>
Kings Park Special - <i>Callistemon ‘Kings Park Special’</i>	Orange Banksia - <i>Banksia prionotes</i>
Kurrajong – <i>Brachychiton populneus</i>	Orchid Tree – <i>Bauhinia variegata (+ cultivar)</i>
L	Oriental Plane – <i>Platanus orientalis</i>
Lemon Flowered Gum - <i>Eucalyptus woodwardii</i>	P
Lemon-Scented Gum – <i>Corymbia citriodora</i> syn <i>Eucalyptus citriodora</i>	Peppermint Tree – <i>Agonis flexuosa</i>
Leopard Tree – <i>Caesalpinia ferrea</i>	Pink Flowered Yellow Gum - <i>Eucalyptus leucoxylon ‘Rosea’</i> syn <i>Eucalyptus leucoxylon megalocarpa ‘Rosea’</i>
Lilly Pilly – <i>Acmena smithii</i>	Pin Oak – <i>Quercus palustris</i>
Limestone Mallet - <i>Eucalyptus decipiens</i>	Port Jackson Fig – <i>Ficus rubiginosa</i>
Liquidambar – <i>Liquidambar styraciflua</i>	Pricklybark - <i>Eucalyptus todtiana</i>
London Plane – <i>Platanus acerfolia</i>	Pride of Bolivia - <i>Tipuana tipu</i>
Lyndsay Gum - <i>Eucalyptus erythronema</i>	Purple Leafed Plum - <i>Prunus x blireana</i>

Pyramid Tree - <i>Lagunaria patersonii</i>	Swamp Mallee - <i>Eucalyptus occidentalis</i>
Q	Swamp Mallee - <i>Eucalyptus spathulata</i>
QLD Brushbox – <i>Lophostemon confertus</i>	Swamp Paperbark – <i>Melaleuca ericifolia</i>
R	Swamp Sheoak – <i>Casuarina obesa</i>
Raywood Ash - <i>Fraxinus oxycarpa</i> ‘Raywood’	Swan River Mahogany - <i>Eucalyptus marginata</i>
Red-Cap Gum - <i>Eucalyptus erethrocorys</i>	Sweet Gum – <i>Liquidambar styraciflua</i>
Red-Flowered Mallee - <i>Eucalyptus erythronema</i>	Sydney Blue Gum - <i>Eucalyptus saligna</i>
Redheart - <i>Eucalyptus decipiens</i>	T
Red Flowering Gum – <i>Corymbia ficifolia</i> syn <i>Eucalyptus ficifolia</i>	Tipu Tree – <i>Tipuana tipu</i>
Red Ironbark Gum - <i>Eucalyptus sideroxylon</i> ‘rosea’	Tuart - <i>Eucalyptus gomphocephala</i>
River Gum - <i>Eucalyptus rudis</i>	W
River Sheoak – <i>Casuarina cunninghamiana</i>	WA Blue Gum - <i>Eucalyptus rudis</i>
Rottnest Cypress – <i>Callitris preissii</i>	Wallangara White Gum - <i>Eucalyptus scoparia</i>
Rottnest Island Tea Tree – <i>Melaleuca lanceolata</i>	Weeping Bottlebrush – <i>Callistemon viminalis</i>
S	Weeping Paperbark - <i>Melaleuca leucadendron</i>
Salt Sheoak – <i>Casuarina Obesa</i> syn <i>Casuarina glauca</i>	White Mallee - <i>Eucalyptus erythronema</i>
Saw-toothed Banksia – <i>Banksia prionotes</i>	White Maple – <i>Acer saccharum</i>
Scarlet Gum - <i>Corymbia ficifolia</i> syn <i>Eucalyptus ficifolia</i>	Willow Gum - <i>Eucalyptus scoparia</i>
Slender Banksia - <i>Banksia attenuata</i>	Y
Smooth Barked Apple Gum – <i>Angophora costata</i>	Yellow Box – <i>Eucalyptus melliodora</i>
Snow in Summer - <i>Melaleuca linarifolia</i>	
Southern Magnolia – <i>Magnolia grandiflora</i>	
Southern Mahogany – <i>Eucalyptus botroides</i>	
Spotted Eucalyptus – <i>Corymbia maculata</i> syn <i>Eucalyptus maculata</i>	
Stout Paperbark - <i>Melaleuca preissiana</i>	
Sugar Gum – <i>Eucalyptus cladocalyx</i>	
Sugar Maple - <i>Acer saccharum</i>	
Swamp Banksia – <i>Banksia littoralis</i>	

13.0 Appendix D Plant Information Fact Sheets

14.0 Appendix E Recommended Climber, Groundcover and Shrub Species List