URBAN AREA FLORA AND FAUNA REVIEW

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1.0 INTRODUCTION

The aim of this document is to:

- Provide an assessment of the habitat available to flora and fauna,
- Outline any legislative limitations for the site,
- Outline opportunities and constraints for the site,
- Assist in the dedication process.
- Describe a range of tree and shrub species available to be used in street plantings within the Penrith lakes Scheme,
- Outline the different uses of trees and shrubs, and
- Outline which species are preferred for which purposes

2.0 BACKGROUND

The 1987 Deed has a number of basic landscape principles to guide revegetation of the Lakes Scheme. Amongst these was the direction to develop a manual which would outline guidelines and principles for landscape design associated with the Penrith lakes Scheme.

Schedule 8.4 of the 1987 Deed of Agreement contains the "Landscape Planning and Design principles". The aim of these principles is to optimise the visual and landscape resources afforded by the site and its enclosing environs, and to plan so that structures and land uses within and adjoining the site do not degrade the landscape quality within the site or from external viewing points.

The following principles and points based on the Deed, Various DA's and the Landscape Manual should guide landscaping throughout the scheme.

- Overall the natural land and lake forms theme adopted for the scheme shall be visually consistent with the regional landscape context.
- Materials used in the scheme shall be generally those materials found naturally on the site.
- Indigenous native trees and shrubs of the flood plain shall be generally used throughout the scheme to reinforce and extend the regional character.
- Exotic trees may be used within a heritage curtilage to aid in historical interpretation and to reinforce the sense of place.
- Native plants may be substituted for indigenous native plants depending on the characteristics required.

- Plantings in urban areas should take into consideration and not obstruct viewlines to water bodies and key local landscape features.

3.0 EXISTING FLORA AND FAUNA

The main vegetation community that can be found in adjacent properties consists primarily of domestic gardens with ornamental plantings along with some native (though not necessarily indigenous) species used.

The vegetation on site consists primarily a naturalised ground stratum. There are also a number of planted tree and shrub cells surrounding the Eastern Lakes. The surrounding landscape (see Figure 1), but not forming part of this site, contains fragmented vegetation including Cumberland Plains Woodland, Castlereagh Ironbark Forest and Castlereagh Scribbly Gum Woodland, Riparian Forest, Alluvial Woodland and Shale Gravel Transition Forest.

Common species used in the Eastern Lakes revegetation include *Eucalyptus* species primarily *amplifolia* and *tereticornis* and *Casuarina cunninghamiana* in the canopy stratum with species of *Acacia, Callistemon* and *Kunzea* making up the shrub stratum. The complete species list are identified in Table 3

Table 1 Native flora species used in previous revegetation works

SCIENTIFIC NAME	COMMON NAME
Acacia binervia	Coastal Myall
Acacia falcata	Sickle Leaf Wattle
Acacia fimbriata	Fringed Wattle
Acacia floribunda	Sally Wattle
Acacia implexa	Hickory Wattle
Acacia parramattensis	Sydney Green Wattle
Allocasuarina littoralis	Forest Oak
Angophora floribunda	Rough Barked Apple
Angophora subvelutina	Broad Leaf Apple
Brachychiton populneus	False Indigo
Bursaria spinosa	Blackthorn
Callistemon linearis	Tea Tree Bottlebrush
Callistemon salignus	Paperbark
Casuarina cunninghamiana	River Oak
Casuarina glauca	Swamp oak
Corymbia maculata	Spotted Gum
Corymbia sp	
Daviesia ulicifolia	Egg and Bacon Bush
Dodonaea triquetra	Hops Bush
Dodonaea viscosa	Hops Bush
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus baueriana	Blue Box
Eucalyptus botryoides	Swamp Mahogany
Eucalyptus crebra	Narrow Leaf Ironbark
Eucalyptus euginoides	Thin Leaved Stringybark
Eucalyptus fibrosa	Red Ironbark
Eucalyptus globoides	White Stringybark
Eucalyptus mollucana	Grey Box
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus viminalis	Ribbon Gum
Hakea sericea	Needlebush
Hibiscus heterophyllus	Rosella

Jacksonia scopara	Dogwood
Kunzea ambigua	Tick Bush
Leptospermum sp	Tea tree
Leptospermum polygalifolium	Tea Tree
Lomandra longifolia	Matt Rush
Melaleuca decora	Paperbark
Melaleuca ericifolia	Swamp paperbark
Melaleuca linariifolia	Snow in Summer
Melaleuca nodosa	Prickly Leaved Paperbark
Melaleuca stypheloides	Prickly Leaved Tea tree
Pittosporum undulatum	Sweet Pittosporum
Syncarpia glomulifera	Turpentine

The planted tree cells were originally dominated by riparian species. Due to natural attrition the original ratio of plants has altered with some species reduced to small numbers. As such the cells could not be described as representing a particular plant community at this stage.

Nineteen environmental weed species have been recorded from the site; these are identified in Table 2. None of these species are declared weeds under the NSW Noxious Weeds Act 1993.

Table 2 Environmental weeds present.

SCIENTIFIC NAME	COMMON NAME
Anagallis arvensis	Blue Pimpernel
Araujia hortorum	Moth Vine
Bidens pilosa	Cobblers Pegs
Chloris gayana	Rhodes Grass
Cirsium vulgare	Spear Thistle
Digitaria sp	Crabgrass
Ehrharta erecta	Panic Veldtgrass
Eragrostis curvula	African Lovegrass
Heliotropium amplexicaule	Blue heliotrope
Paspalum dilatatum	Paspalum
Pavonia hastate	Pavonia
Pennisetum clandestinum	Kikuyu
Phytolacca octandra	Inkweed
Rhynchelytrum repens	Red Natal Grass
Rumex sp	Dock
Sida rhombifolia	Paddy's Lucerne
Solanum pseudocapsicum	Jerusalem Cherry
Tagetes minuta	Stinking Roger
Verbena bonariensis	Purple Tops

Forty one threatened fauna species listed on the TSC and/or EPBC Acts have either been recorded within 10 km of the study area or have potential habitat within 10 km of the Lakes Scheme.

The fauna habitat along the eastern portion of the Scheme is generally considered to be in poor to moderate condition. The poor condition of the understorey and ground habitat along the areas limits their value for ground based fauna and care should be taken to conserve habitat to improve potential for threatened fauna species survival.

No Flora or Fauna species protected by the NSW Threatened Species Act 1995 or the Environmental Protection and Biodiversity Conservation Act 1999 have been observed within the immediate vicinity of the Urban area.

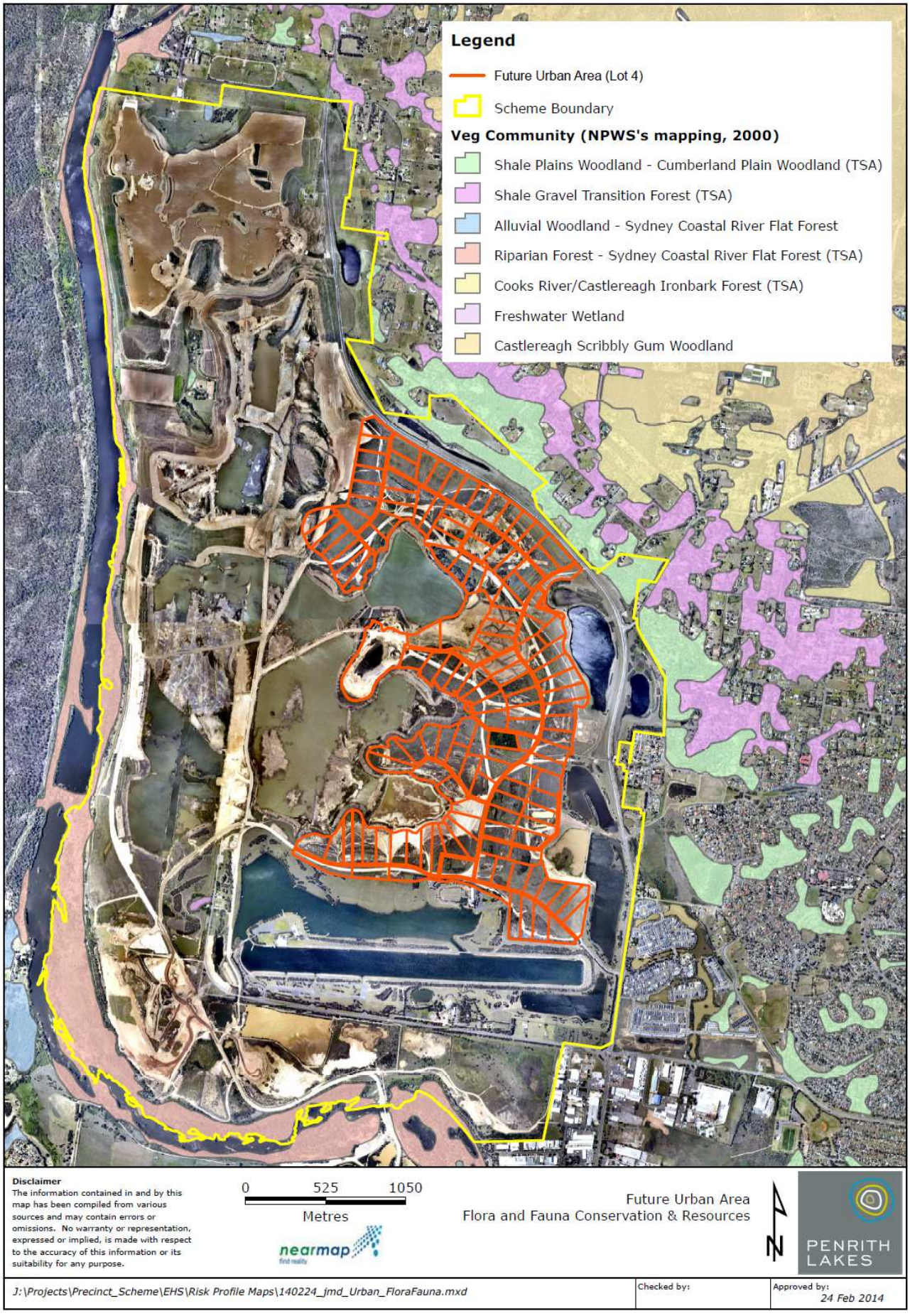


Figure 1 – Proximity of DA5 area to natural vegetation

4.0 IMPACT ASSESSMENT

There is no evidence of threatened fauna in the immediate vicinity of this site. The future presence of threatened fauna is not likely due to the close proximity of the busy Castlereagh Road on one side of the site and the residential area on the other sides.

Although the plant species used in revegetation of the site are indigenous to the local area, selection was based primarily on aesthetic appeal rather than habitat value. Due to natural attrition since maintenance in the form of irrigation stopped, the original high diversity of species has reduced.

None of the trees present on site are large enough or old enough to provide habitat in the form of hollows for nesting.

Due to the poor habitat quality of the site and the lack of connection to larger areas of native vegetation the potential to impact upon threatened ecological communities or threatened species through the development of this site is minimal.

5.0 STREET TREES

5.1 RECOMMENDED SPECIES

***Acmena smithii* - Lily Pily**

An attractive small tree due to its coloured new leaf growth, flowers and fruit. The fruit and flowers are attractive to birds. Lily Pilys are hardy once established but may need protection from frost and drought when young.

***Brachychiton populneus* - Kurrajong**

Attractive small tree. Slow growing so it will not impede on powerlines or obstruct views for some time.

***Callistemon salignus* or *viminalis* - Bottlebrush**

Good small street tree with attractive flowers. Tolerant of frost and drought making it a low maintenance street tree.

5.2 LIMITED USE SPECIES

***Allocasuarina & Casuarina species* - She Oaks.**

She Oaks produce a large mass of fibrous roots which can cause damage to drains and sewers. They also produce woody capsules which can cause slip hazards if overhanging footpaths.

- Allocasuarina are more drought tolerant than Casuarina and tend to be smaller in size.
- Casuarina cunninghamiana and glauca. - Glauca is more likely to sucker than cunninghamiana. Cunninghamiana is more drought sensitive than glauca.

***Angophora, Corymbia and Eucalyptus species* - Gum Trees**

Some Gum trees should not be used for urban street plantings due to their size. There are applications for their use and they can be used effectively as an avenue planting on wide verges free from below and above ground services and set back from roadways. If planted too close to the curb they will pop up the gutter at a later date.

- *Angophora* tend to have twisted branches giving them a very informal organic look.

- *Eucalyptus* and *Corymbia* species with smooth pale bark make popular street trees. Popular smooth bark species include *Corymbia maculata, Eucalyptus amplifolia, E. punctata, E. salignus, E tereticornis,* and *E. Viminalis.*

***Syncarpia glomulifera* - Turpentine**

Similar in size to Gum trees so its locations for use are limited. Turpentines tend to have a more symmetrical formal look than Gum Tree species which lends them to a different purpose.

***Melia azederach* - White Cedar.**

There is a public perception that the berries are highly poisonous and will kill children. While they do have toxins in them the quantity required to be eaten to produce a toxic effect is quite large. The berries can cause slip hazards if overhanging footpaths and they suffer from attack by the caterpillars of the White Cedar Moth. Produces large volumes of purple flowers making for an attractive display.

***Melaleuca species* - Paperbarks.**

Can cause major damage to drains and sewers and if used they should be set back from services.

***Tristaniopsis laurina* - Water Gum.**

Although a very attractive tree they will require watering during dry periods to maintain healthy condition.

5.3 NON RECOMMENDED SPECIES

***Acacia species* – Wattles**

Generally speaking the short life span of most species of wattles prevents them from making useful street trees. There are applications for their use as infill plantings in screens and several of the longer lived species have use as street trees.

***Corymbia citriodora* - Lemon Scented Gum.**

Large Eucalypt with long, lateral branches that are prone to sudden failure.

***Eucalyptus nicholi* - New England Peppermint**

Popular street tree of the 1980's which were largely removed in the mid to late 1990's due to poor health.

***Ficus species* - Figs**

Major damage to drains and sewers but can be used in parklands or as avenue plantings on wide verges free from below and above ground services.

***Platanus species* - Plane Tree**

Large wide crowned deciduous tree which is hardy in most situations. Their pollen can cause allergic reactions in some cases. Their use within the scheme should be limited to parks and wide avenues within heritage precincts only.

***Robinia pseudoacacia* - False Acacia**

Has been used for street tree plantings throughout Penrith. Suckers prolifically if roots are disturbed. Can develop woody spines similar to Gleditsia. Has the potential to become a weed in native areas.

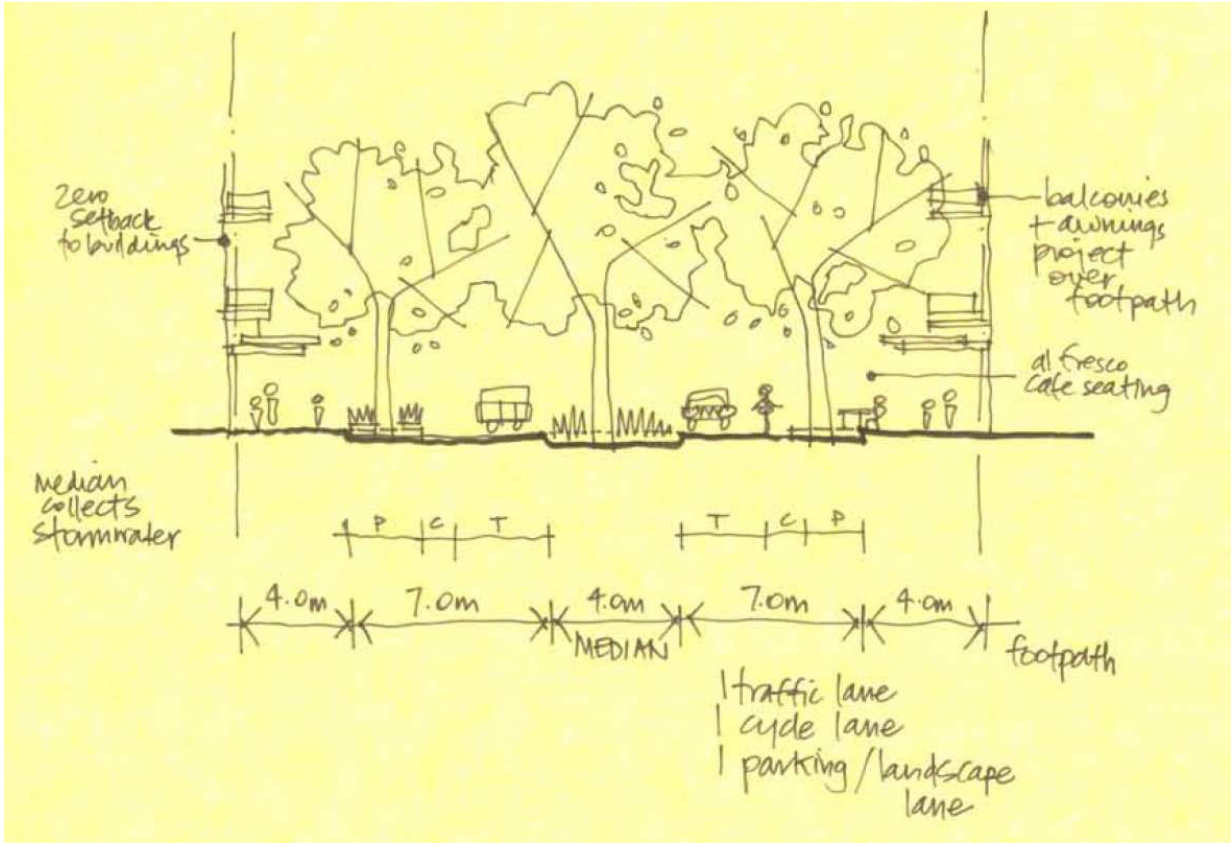
Table 3 Tree species suitable for use within urban areas

SCIENTIFIC NAME	COMMON NAME	HEIGHT X WIDTH	NOTES
Acacia binervata	Two-veined Hiclory	4-15 x 4-10	Long-lived; Bushy to ground; Fast growing, often on disturbed sites; Flowers pale yellow
Acacia binervia	Coastal Myall	15 x10m	Coloniser, handsome, fast growing, prune lower branches for excellent street tree; rods of golden flowers.
Acmena smithii	Lilly Pily	6-20 x 3-10	Flowers autumn to spring; Pale violet to mauve fleshy fruit
Allocasuarina torulosa	Forest She-Oak	8-25 x 5-10	Conical shape, weeping foliage, purple tinge in winter, hardy: Fast growing; Form extensive pure stands
Angophora bakeri	Narrow-leaved Apple	3-20 x 2-10	Grows well in very poor soils. Flowers creamy-white
Angophora costata	Salmon Gum	10-30 x 6-20	Flowers cream-white. Bark smooth and pink in colour.
Angophora floribunda	Rough-barked Apple	8-30 x 4-15	Adapt to range of soils and climatic conditions; Susceptible to frost damage while young; Flowers creamy-white.
Angophora subvelutina	Broad-leaved Apple	10-30 x 6-20	Dense crown; Susceptible to frost damage while young; Flowers creamy-white. Leaves are mostly stemless giving a different texture to the canopy.
Backhousia myrtifolia	Grey Myrtle	3-15x2-4	Relatively slow growth. Forms thickets; fresh foliage; Yellow-green flowers. Hardy Bushy to ground level;
Callistemon salignus		4-15 x 3-5	Brilliant pink new growth, lemon flowers; Papery bark; Excellent for hedges. Prune to keep as shrub. Useful in boggy areas.
Casuarina cunninghamiana	River She-Oak	10-35 x 10-12	Withstands inundation; Vigorous growth; conical growth form; Useful to prevent erosion; Dead twigs and cones drop
Casuarina glauca	Swamp Oak	4-30 x 3-12	Forms small groves; Tolerant of strong winds; Useful in poorly drained areas; Dead twigs and prickly cones drip; Useful in erosion control
Corymbia gummifera	Red Bloodwood	20-30 x 8	Flowers creamy white
Corymbia maculata	Spotted Gum	20-30 x 8	Flowers cream
Eucalyptus amplifolia	Cabbage Gum	10-30 x 4-12	Good for cluster planting with E. baueriana and A subvelutina, but needs moister, deeper soils than the others; Flowers white.
Eucalyptus baueriana	Blue Box	12-28 x 8-15	Dense crown; Intolerant of long dry periods; Branches pendulous.
Eucalyptus benthamii	Camden White Gum	15-40 x 10-20	Dense spreading crown; Fast growing in good conditions; Attractive white barked tree; Flowers white.
Eucalyptus botryoides	Bangalay	12-40 x 10-25	Fast growing; Responds well to hand pruning – may coppice; Prone to attack by psyllids; Flowers white; Browsed by Koala.
Eucalyptus crebra	Narrow leaved Ironbark	10-30 x 8-15	Initially slow growing; Tolerant of heavy soils; Ornamental; Flowers white.
Eucalyptus deanei	Mountain Bluegum	20-45 x 10-20	Sheltered sites; Requires well drained moist soils; Attractive white barked tree; Flowers white
Eucalyptus eugenioides	Thin Leaved Stringybark	10-30 x 5-12	Spreading crown; Fast growing initially; Flowers white; Grassy forest, woodland

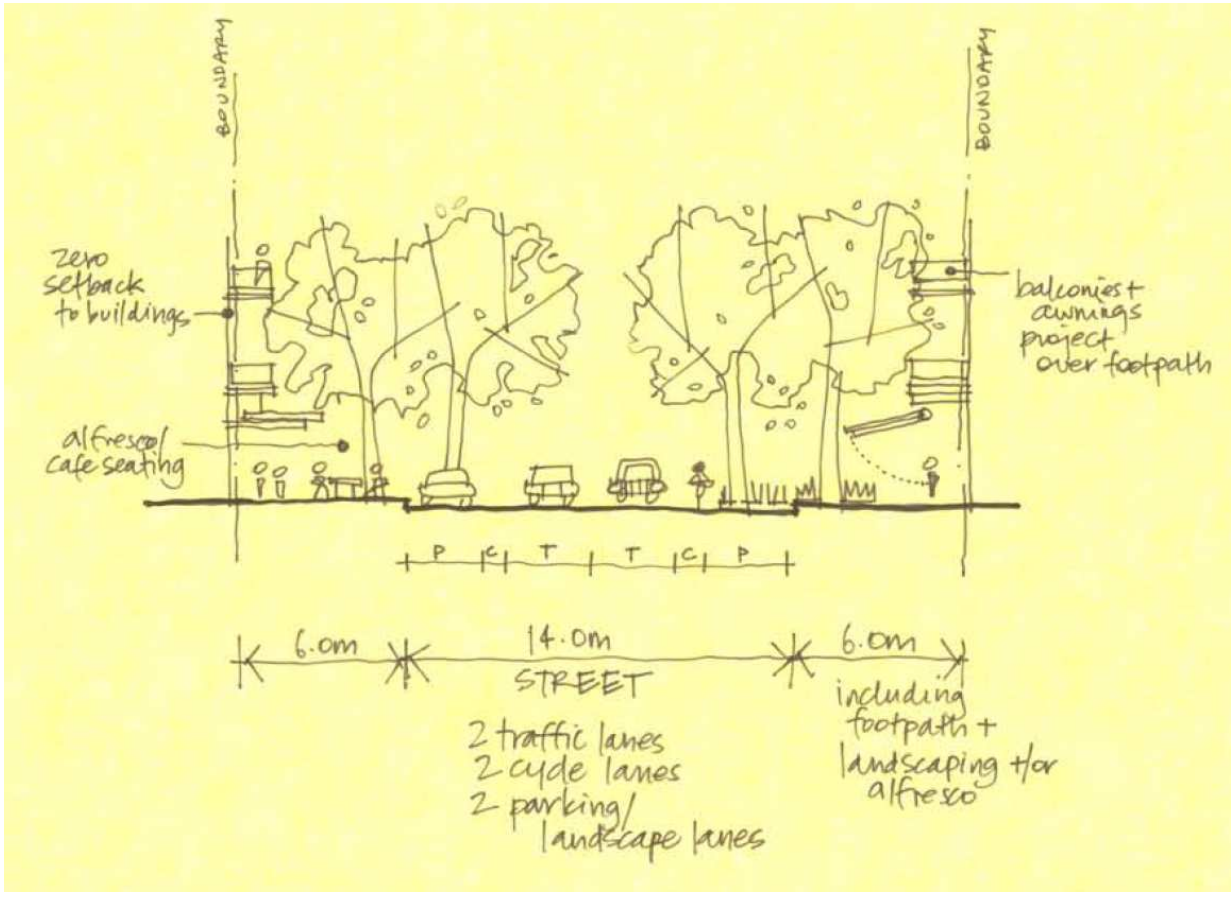
Eucalyptus fibrosa	Broad-leaved Ironbark	15-35 x 5-20	Fast growing initially; Tolerant of wide range of conditions but requires well-drained sites; Flowers white;
Eucalyptus globoidea	White Stringy bark	10-30 x 8-20	Frost tender when young; Adaptable to wide range of conditions; Flowers white; Browsed by Koala
Eucalyptus moluccana	Grey Box	15-25 x 6-20	Widely spreading crown in open situations; Flowers white
Eucalyptus oblonga	Narrow-leaved Stringbark	10-18 x 5-12	Spreading habit; Retain lower branches; Flowers white.
Eucalyptus parramattensis	Parramatta Red Gum	10-20 x 8-18	Flowers white; Low lying sites, woodland, periodically wet; Browsed by Koala
Eucalyptus punctata	Grey gum	10-35 x 10-20	Koala staple; Trunks become colourful at certain time of year; Flowers white
Eucalyptus saligna	Sydney Blue Gum	20-50 x 10-25	Clean attractive trunk; Spreading crown; Fast growing in good conditions; Subject to attack by lerps and scale; Sheltered sites; Flowers white
Eucalyptus sclerophylla	Scribbly Gum hard leaved	5-20 x 10-15	Spreading habit; Pale bark; Attractive tree; Flowers white;
Eucalyptus sideroxylon	Mugga Red Ironbark	30 x 10-20	Excellent specimen tree; Fast growing initially; Requires good drainage; Flowers white, purple, red
Eucalyptus tereticornis	Forest Red Gum	10-35 x 6-15	Good shade tree; Moderately fast growing; White flowers attract bats, possums, koala staple;
Glochidion ferdinandi	Cheese Tree	6-8 x 3-5	Bushy habit, rounded crown; Leaves attached by caterpillars; Fast growing; hardy;
Lophostemon confertus	Brush Box	10 x 10	Australian native though not indigenous to Castlereagh. Popular street tree. Similar colours to Plane trees and can be used to create a similar atmosphere.
Melaleuca decora	White Feather Honeymyrtle	5-20 x 2-10	Dense bushy canopy; Papery bark; Young growth bright green; Grows in range of soil and climatic conditions; Flowers white;
Melaleuca linariifolia	Snow in Summer	5-10 x 4-8	Very hardy; Abundant, massed cream flowers; Dense habit; Lawn specimen; Useful boggy areas; Fast growing; Tolerates periodic inundation.
Melaleuca styphelioides	Prickly Paperbark	6-20 x 5-10	Hardy, dense, excellent street tree; Tolerant of flooding; Tolerates hard pruning; Erect bushy habit; Flowers white.
Melia azaderach	White cedar	6-25 x 5-15	Deciduous; Fruit yellowish, fleshy; Responds well to pruning and pollarding; Flowers lilac, scented.
Rapania variabilis	Muttonwood	6-10 x 3-5	Forms coppices from root suckers; Fruit fleshy, blue, purple; Sheltered sites; Long lived, Flowers creamy-white.
Syncarpia glomulifera	Turpentine	18-30 x 8-15	Lawn specimen; Leaves get sooty mould; Hardy, fast growing; Requires ample moisture.
Tristaniopsis laurina	Water Gum	3-30 x 3-5	Multi-stemmed; Smooth streaked bark; Attractive foliage, bright yellow flowers; Boggy ground; Flood tolerant;

Table 4 Shrub species suitable for use within urban areas

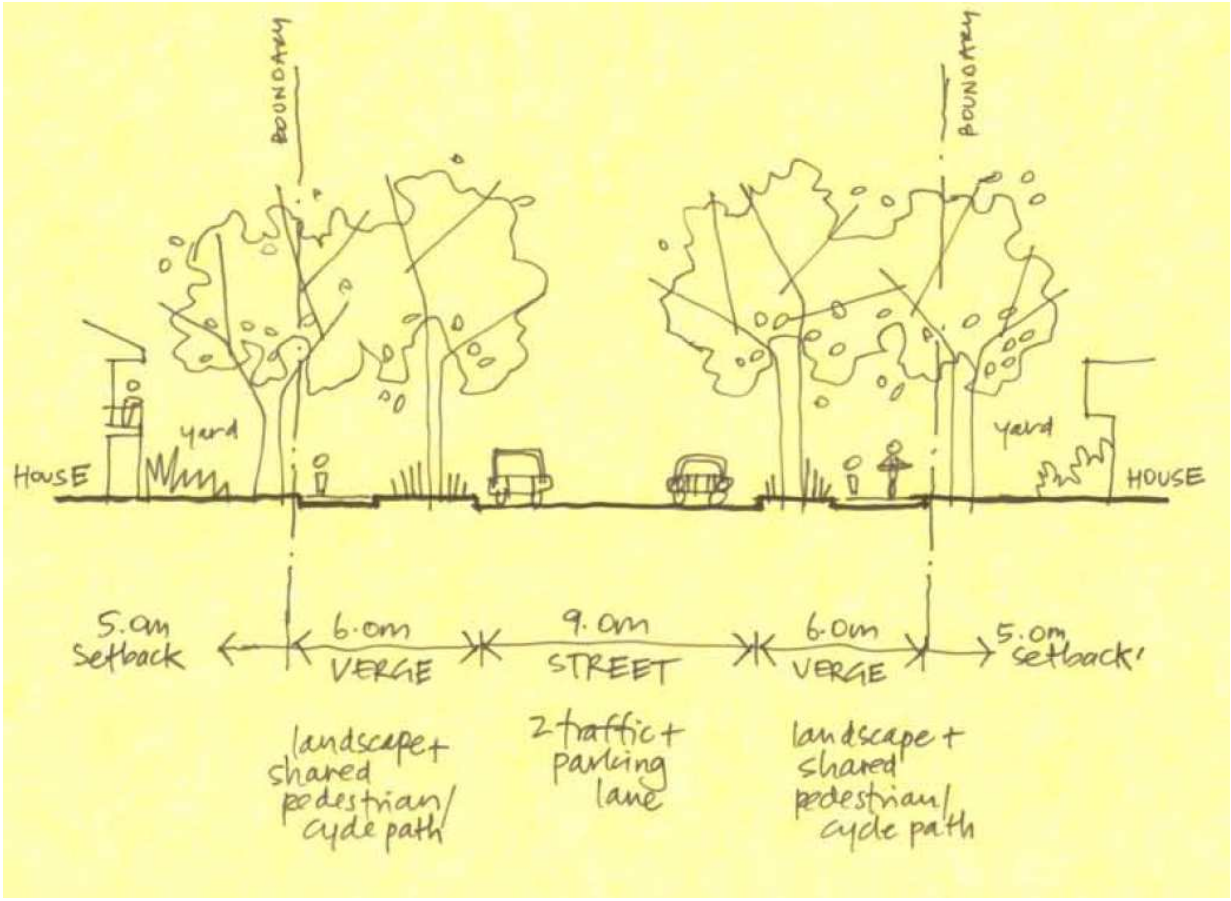
SCIENTIFIC NAME	COMMON NAME	HEIGHT X WIDTH	NOTES
Acacia fimbriata	Fringed Wattle	2-8 x 2-5	Showy graceful species; bushy; tolerant of wide range of soils and situations; Prefers good drainage.
Callistemon linearis	Narrow-leaved Bottlebrush	1.5-4 x 3-5	Useful as border; Hardy; Pruning promotes dense growth; Withstands waterlogging, high winds; Flowers pale red
Clerodendrum tomentosum	Hairy Clerodendrum	2 x 1.5-10	Flower heads dense, cream coloured and followed by succulent fruit black in red calyx;; Frost tender when young; Requires water in dry periods.
Daviesia ulicifolia	Gorse Butter Pea	1-2 x 0.5-2	Long-flowering; Spiky shrub; Yellow flowers with red-brown marks; Hardy; Pruning promotes dense growth; Excellent restrictive plant; Flowers yellow to yell-orange.
Dillwynia seiberi	Egg and Bacon	1-2 x 0.5-2	
Grevillea juniperina	Spider Flower	0.5-4 x 1.5-6	Can tolerate extended wet periods; Responds well to pruning; Can restrict access due to pungent leaves; Flowers red, yellow, pale orange, or greenish.
Jacksonia scoparia	Dogwood	3-5	Branches pendulous; Some root suckering; Responds well to pruning; Flowers yellow.
Kunzea ambigua	Tick bush	1-4 x 1-5	Hardy; Fast-growing, masses of scented white flowers; Useful for hedges; Responds well to pruning; Useful for soil stabilisation.
Leptospermum polygalifolium	Lemon-scented Tea tree	2-6 x 1.5-3	White flowers. Young foliage reddish or bronze; Responds well to pruning; Useful for cut flowers and foliage; Wet places
Melaleuca nodosa	Prickly-leaved Paper bark	3 -6 x 2-4	Hardy, rounded shrub; Pale yellow flower heads; forms thickets: Adapts to various soils and positions.
Melaleuca thymifolia		1-2 x 1-2	Prickly; responds well to pruning; Useful as barrier hedge; Flowers pink-mauve; Useful for swamp margins and damp places.
Notelaea longifolia	Large mock olive	6-10 x 4-6	Excellent for planting below established tall trees; Fruit black, fleshy; flowers cream-green
Ozothamnus diosmifolium	White Dogwood	1.5-2 x 1 (-5)	White or pink flower heads; Long flowering period; Fresh or dried cut flowers; Prune after flowering; Fast growing, short lived



Typical divided street plantings



Typical Main Street plantings



Typical residential street planting