
3.3 WATER SENSITIVE URBAN DESIGN

Water Sensitive Urban Design (WSUD) principles have been applied with the aim of achieving more sustainable stormwater management. It aims to reduce flow rates and levels of pollution reaching natural watercourses and includes the reuse of stormwater within the urban environment.

The following principles, which are reproduced from *Urban Stormwater: Best Practice Environmental Management Guidelines* (Victorian Stormwater Committee, 1999), have been applied to the Landscape Plan:

- Protecting natural systems (creeks, rivers and wetlands) within the catchments of urban proposed development.
- Improving the quality of stormwater runoff draining from urban developments.
- Integrating stormwater treatment into the landscape by using systems that provide multiple benefits including water quality treatment, wildlife habitat, public open space, recreational and visual amenity.
- Reducing peak flows from developments by on-site temporary storage measures (with potential for reuse) and minimising impervious areas.
- Reducing potable water demand by using stormwater as a resource through capture and reuse for non-potable purposes.

WSUD measures applied within the open space network include the installation of:

- vegetated swales and filter strips
- bio-retention systems
- permeable pavements
- infiltration trenches and basins
- rainwater tanks
- landscape works that minimise irrigation water requirements.



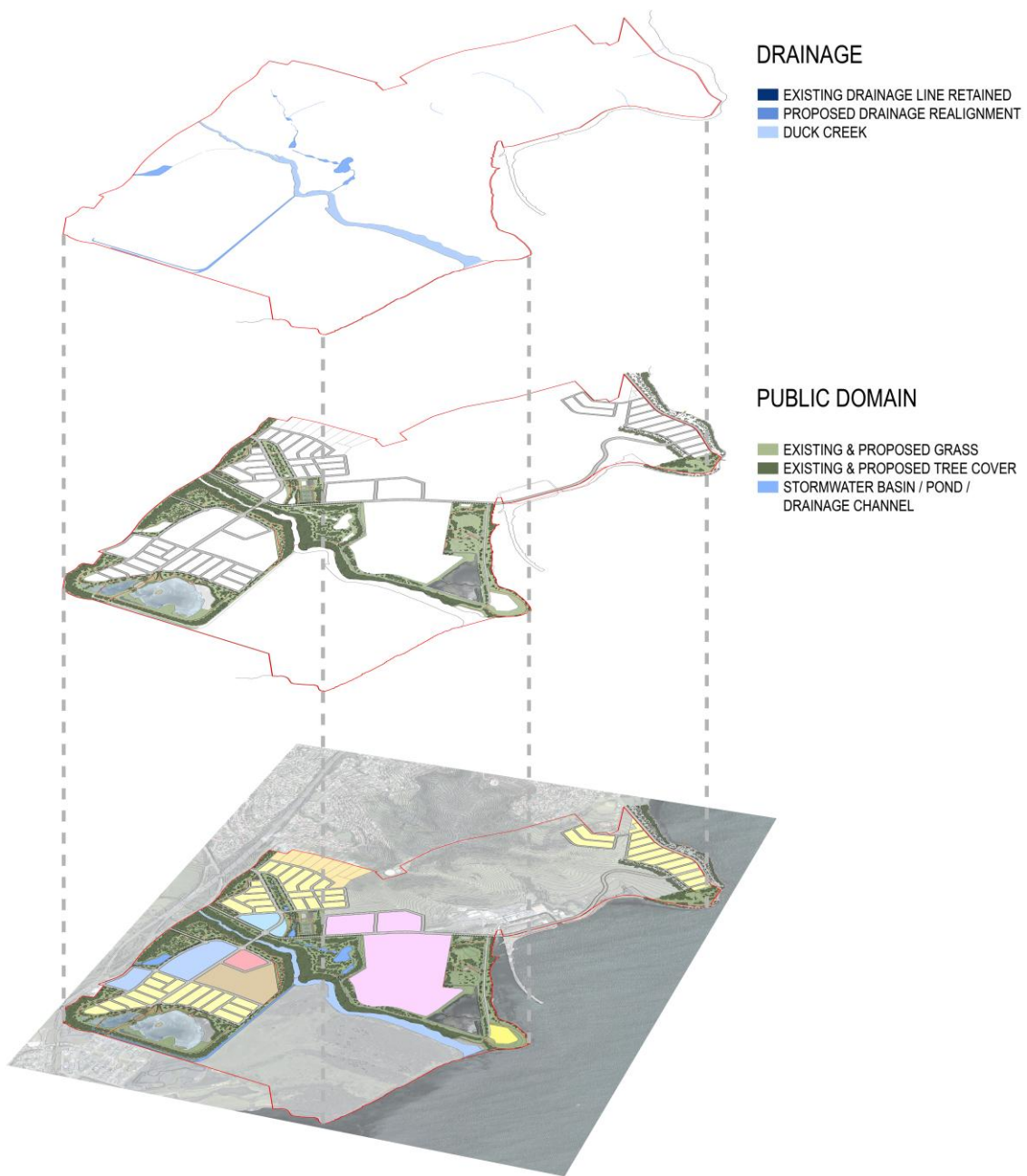


FIGURE 22 – EXISTING AND PROPOSED WATER RESOURCES MANAGEMENT



3.4 CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

The following CPTED strategies, which have been adapted from The *Crime Prevention Through Environmental Design Guidelines* produced by the Queensland Government, are to be applied to the design of open spaces throughout the Tallawarra Lands.

CPTED STRATEGY	INITIATIVES FOR IMPLEMENTATION WITHIN OPEN SPACE
Surveillance	<ul style="list-style-type: none"> - Landscape treatment designed to maximise passive surveillance, increasing the opportunities to see and be seen. - Incorporate a compatible mix of spaces that attract a wide variety of people from the community, prolong the hours of use both day and night, and encourage movement between uses. - Locate active public uses to maximise the passive surveillance that such activity can provide. - Design public spaces to facilitate and encourage a range of community and individual activities. - Planting design to avoid 'blind spots' where the ability to see or be seen is reduced. - Lighting of paths and dwelling spaces to be designed to ensure appropriate surveillance and avoid glare and large shadows.
Legibility	<ul style="list-style-type: none"> - Open space resources to be designed to ensure they are easy to understand and navigate within. - Advantage to be taken of existing natural and man-made features to create landmarks that aid in navigation and way-finding. - A variety of open space to be designed so that each is individually recognisable. - Signage, maps, etc to be used to aid in way-finding, with signage located thoughtfully and logically, and that the signage itself is legible.
Territoriality	<ul style="list-style-type: none"> - Clearly convey boundaries between public open space and private property. - Encourage creative use of built and landscape features to define boundary lines, such as planting, material changes and the like. - Ensure that the design of territorial features does not inhibit passive surveillance. - Avoid creating too many entrances / exits to and from open space resources.
Ownership	<ul style="list-style-type: none"> - Design to promote a sense of pride and ownership of open space resources within the local community. - Design for opportunities for social contact and interaction within open space resources. - Design for the needs and desires of as many community groups as possible to encourage a sense of shared ownership. - Involve the community in future management and enhancement works.
Management	<ul style="list-style-type: none"> - Design with high quality materials to ensure longevity in product life. - Implement management systems that cover such things as rubbish removal and regular maintenance. - Design with materials that have resistant finishes to minimise graffiti and/or vandalism. - Engage a variety of community and business groups for cooperative action in regards to maintenance and management issues.
Vulnerability	<ul style="list-style-type: none"> - Ensure that surveillance take places within potentially vulnerable places, such bus stops, etc. - Provide well-lit, active places for pedestrians and cyclists and avoid 'hidden' or distant spaces. - A variety of routes to and through spaces are to be provided where possible. - Design to minimise blind spots or places of concealment. - Design lighting to ensure appropriate surveillance and avoid glare and large shadows. - Utilise mechanical or active surveillance techniques when required



3.5 OPEN SPACE LANDSCAPE CONCEPTS

The landscape concepts prepared for each open space provide for a variety of active and passive recreation opportunities that form an integrated network.

The selection of plant species within open space areas has been utilised to promote biodiversity at both a regional and local scale as well as strengthening remnant vegetation communities.

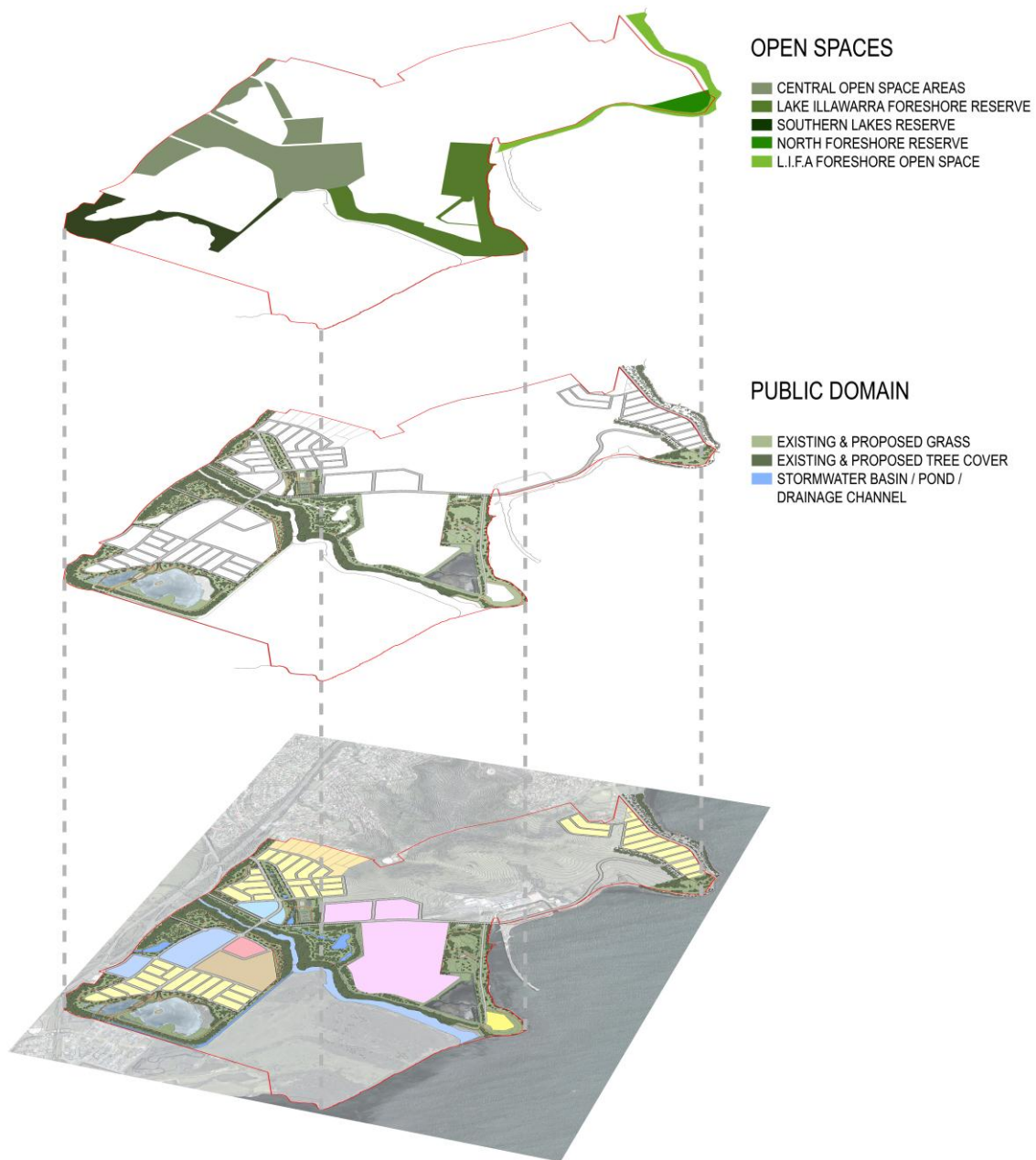


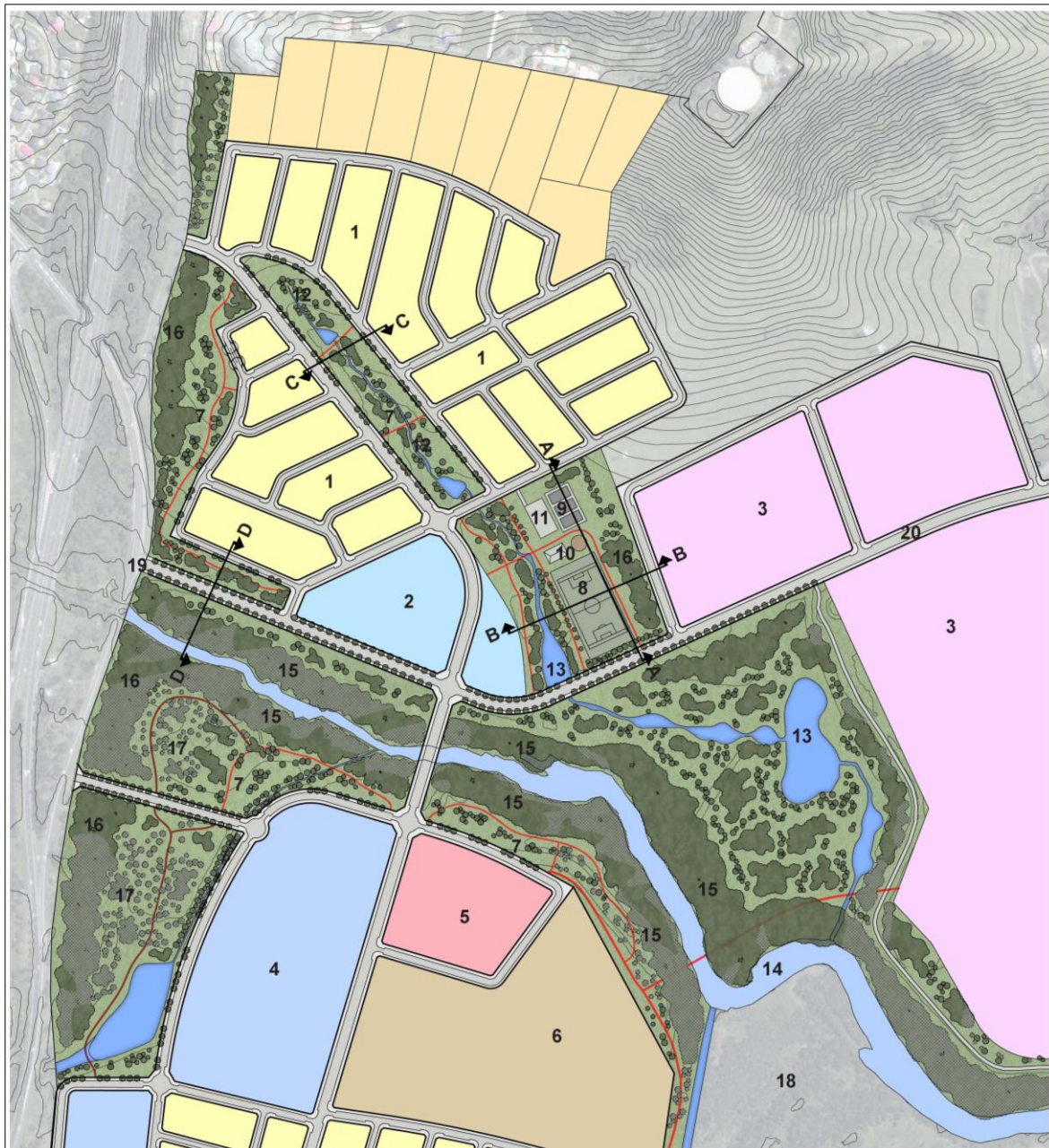
FIGURE 23 – OPEN SPACE COMPONENTS



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3.5.1 CENTRAL PRECINCT OPEN SPACE AREAS



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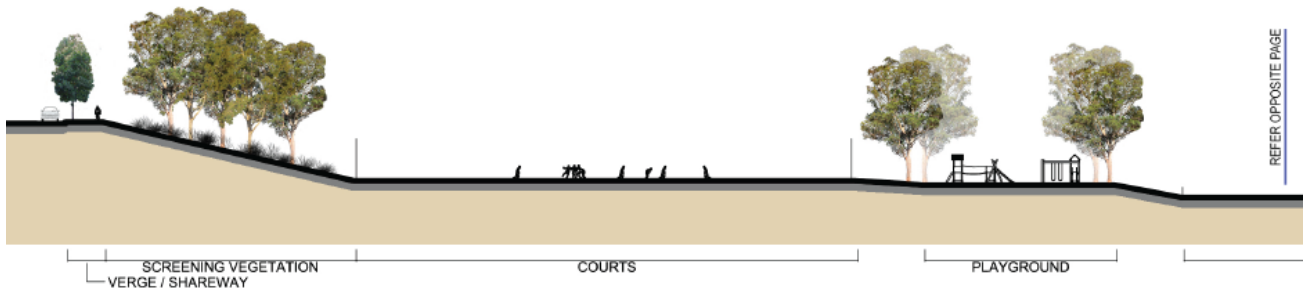
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| <ul style="list-style-type: none"> EXISTING + PROPOSED GRASS EXISTING TREE COVER RETAINED PROPOSED TREE PLANTING PEDESTRIAN AND/OR CYCLE PATH (OFF ROAD) PEDESTRIAN ONLY PATH (OFF ROAD) STORMWATER BASIN / POND / DRAINAGE CHANNEL | <ul style="list-style-type: none"> 1 Central Residential Precinct 2 Neighbourhood Centre 3 Industrial Employment Precinct 4 Enterprise Employment Precinct 5 Primary School 6 Retirement Living 7 Informal recreation 8 Sports field 9 Netball courts 10 Amenities building and playground | <ul style="list-style-type: none"> 11 Car park 12 Existing drainage line retained 13 Stormwater detention / sedimentation basin 14 Duck Creek 15 Duck Creek riparian corridor 16 Woodland screening vegetation 17 Lowland Woollybutt-Melaleuca Forest (EEC) retained 18 Environmental Management Area 19 Main entry 20 Spine road |
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CENTRAL OPEN SPACE PLAN
TALLAWARRA LANDS

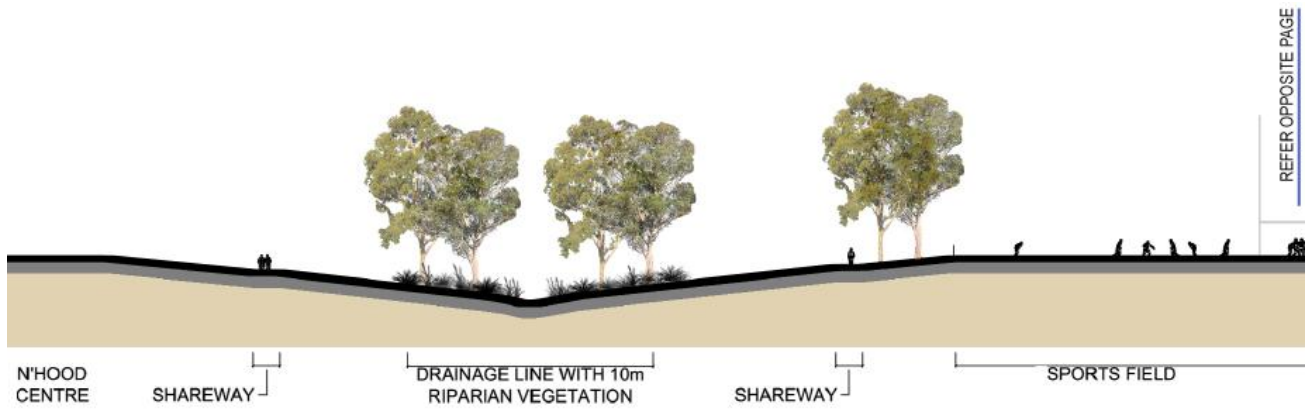
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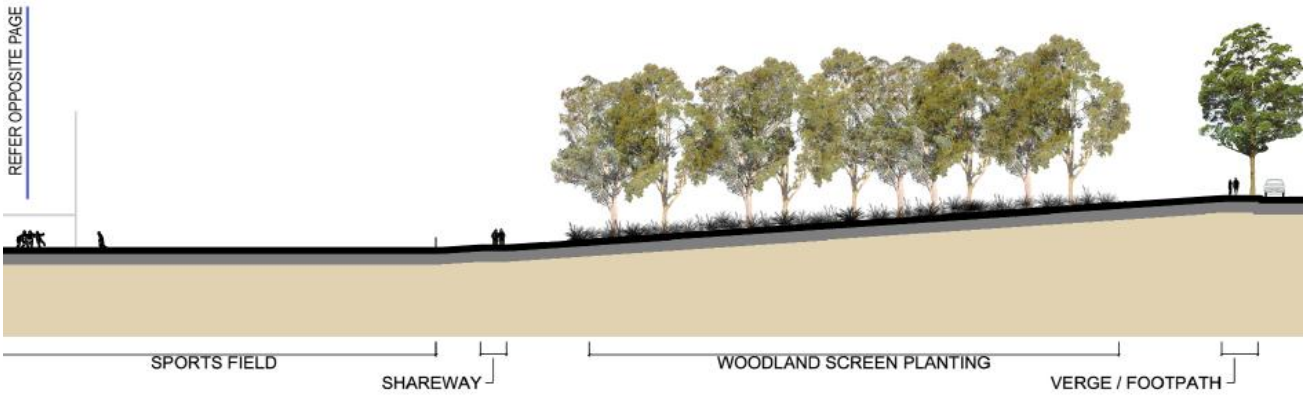
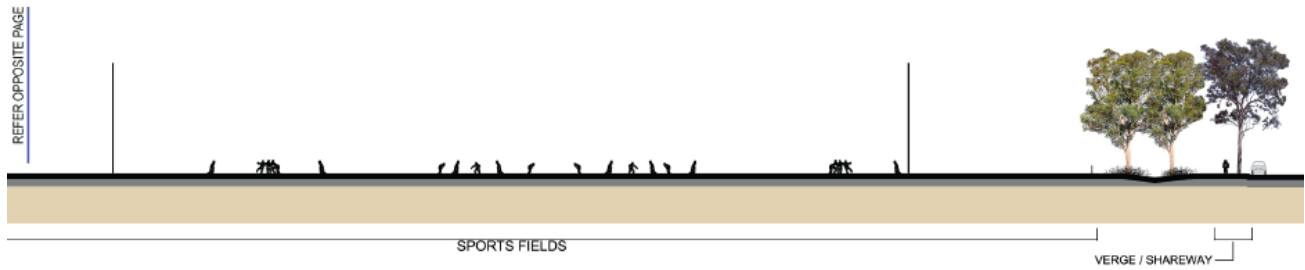


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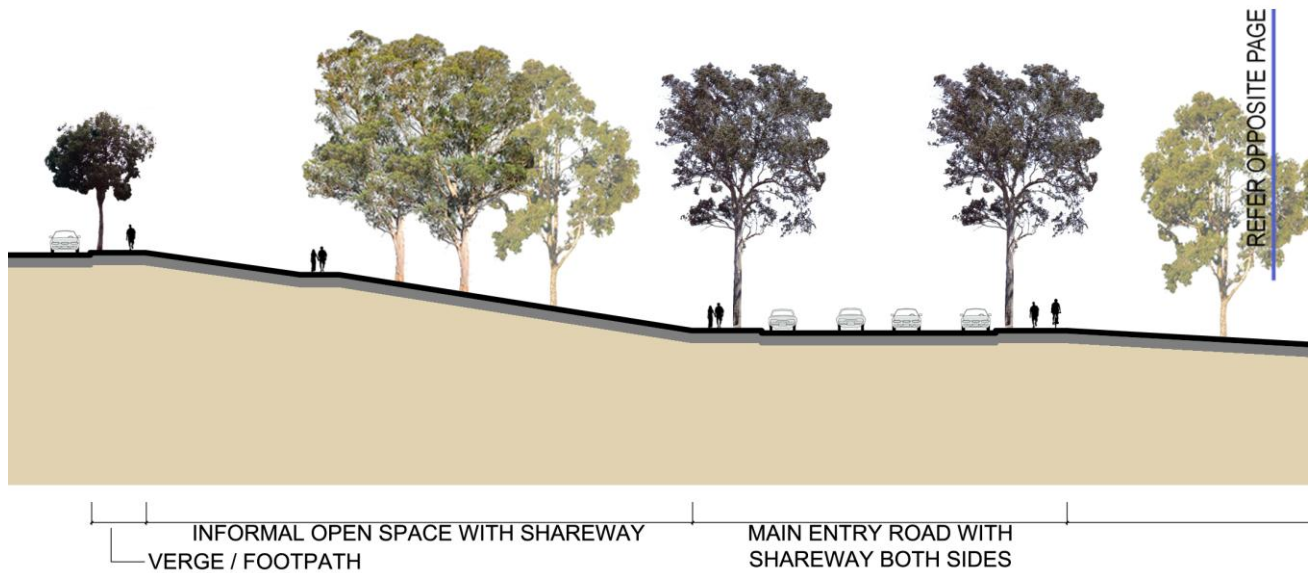
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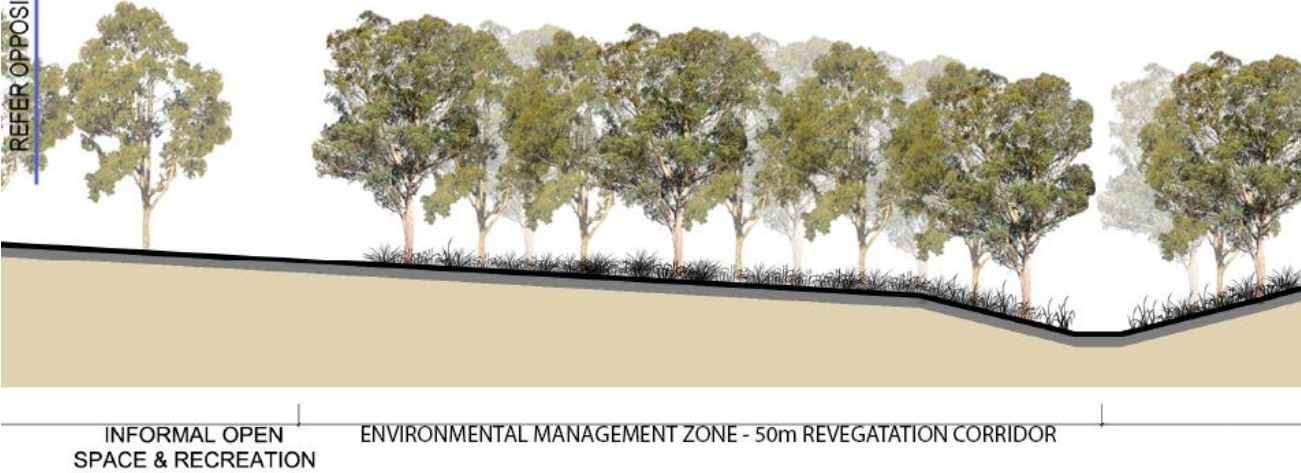
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PLANTING STRATEGY

The landscape character within the open spaces and adjoining proposed land uses vary significantly throughout the Central Precinct. In response, the Precinct has been divided into a number of open space 'zones' so that the Planting Strategy can respond to the particular site conditions and the landscape design objectives for each zone. These open space 'zones' are described in the table below and shown on Figure 24, with a schedule of recommended plant species for each zone presented on the subsequent page.

OPEN SPACE ZONE	SUMMARY DESCRIPTION	PLANTING STRATEGY
Zone 1 – North Western Boundary	North western extent of Tallawarra Lands site boundary Located on the lower slopes of Mount Brown Soils range from light and heavy brown clays to Duck Creek alluvium Good drainage	<ul style="list-style-type: none"> Tree and understorey planting along boundary to reinforce screening from the adjoining Princes Highway Planting along the boundary with residential properties is to be designed to create a 'nil hazard' for bushfire management Encourage establishment of Endangered Ecological Community <i>Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion</i>
Zone 2 – Central Drainage Line	Existing drainage line to be retained in current form Located on the lower slopes of Mount Brown Soils range from light and heavy brown clays to Duck Creek alluvium Good drainage	<ul style="list-style-type: none"> Provide recreation and amenity value to open space for adjoining residents Planting along the boundary with residential properties is to be designed to create a 'nil hazard' for bushfire management
Zone 3 – Sports Field and Courts	Located at the base of Mount Brown slopes Connection to adjoining drainage line and Neighbourhood Centre is important Cut and fill required to construct the playing field	<ul style="list-style-type: none"> Provide recreation and amenity value to open spaces for adjoining residents Tree and understorey planting along eastern boundary to reinforce screening from the industrial commercial zone Planting along the boundary with residential properties is to be designed to create a 'nil hazard' for bushfire management
Zone 4 – Stormwater Quality Ponds	Low-lying flood prone riparian land Duck Creek alluvium soils Restricted drainage	<ul style="list-style-type: none"> Species selection to enhance ecological diversity adjoining Duck Creek corridor Wetland planting to stormwater quality ponds Tree planting in clumps
Zone 5 – Duck Creek Corridor	Adjoins revegetation of Duck Creek Corridor in accordance with Vegetation Management Plan recommendations (Eco Logical Australia 2010) Duck Creek alluvium soils Restricted drainage	<ul style="list-style-type: none"> Tree planting to increase diversity within corridor
Zone 6 – Central Western Boundary	Central area of Tallawarra Lands project site boundary Remnant Lowland Woollybutt-Melaleuca Forest Light yellow brown clay soil Generally good drainage	<ul style="list-style-type: none"> Remnant Lowland Woollybutt-Melaleuca Forest requires conservation and management of natural regeneration Tree and understorey planting along boundary to reinforce screening from the adjoining Princes Highway
Zone 7 – Environmental Management Area	Duck Creek riparian corridor Designated revegetation zone Restricted drainage with periodic flooding	<ul style="list-style-type: none"> Revegetation of Duck Creek Corridor in accordance with Vegetation Management Plan recommendations (Eco Logical Australia 2010)



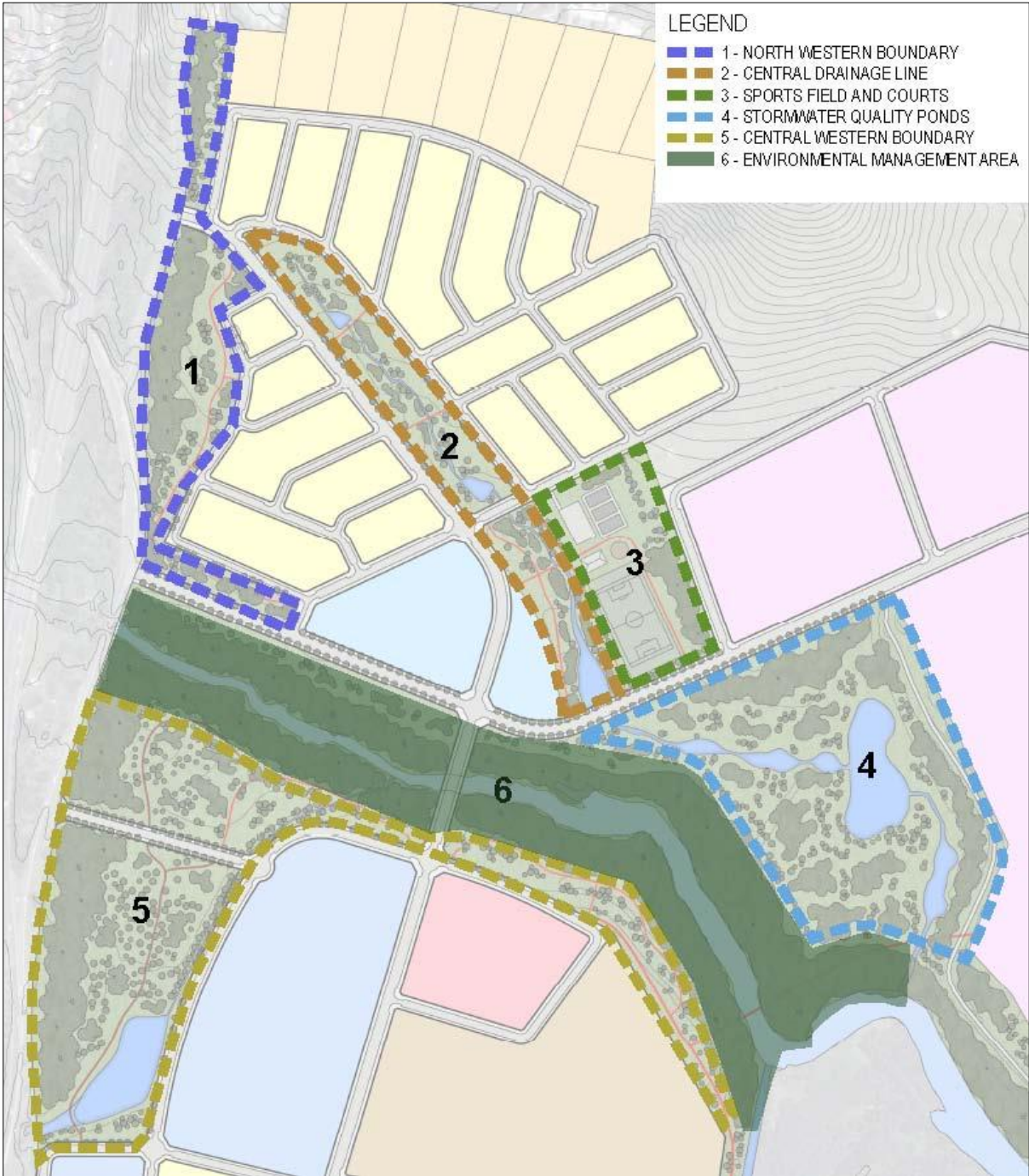


FIGURE 24 – OPEN SPACE ZONES WITHIN THE CENTRAL PRECINCT



PLANT SCHEDULE

BOTANICAL NAME	COMMON NAME	MATURE HEIGHT x WIDTH	ZONE					
			1	2	3	4	5	6
LARGE TREES								
<i>Angophora floribunda</i>	Rough-Barked Apple	20 x 9m						
<i>Brachychiton acerifolium</i>	Illawarra Flame Tree	20 x 8m						
<i>Brachychiton populuneus</i>	Kurrajong	15 x 8m						
<i>Casuarina glauca</i>	Swamp Oak	15 x 6m						
<i>Corymbia maculata</i>	Spotted Gum	25 x 9m						
<i>Eucalyptus amplifolia</i>	Cabbage Gum	25 x 9m						
<i>Eucalyptus bosistoana</i>	Coastal Grey Box	25 x 9m						
<i>Eucalyptus botryoides</i>	Bangalay	25 x 9m						
<i>Eucalyptus eugenoides</i>	Thin-leaved Stringybark	25 x 9m						
<i>Eucalyptus longifolia</i>	Woollybutt	20 x 9m						
<i>Eucalyptus tereticornis</i>	Forest Red Gum	20 x 9m						
<i>Ficus macrophylla</i>	Moreton Bay Fig	20 x 15m						
<i>Glochidion sumatranum</i>	Umbrella Cheese Tree	12 x 4m						
<i>Livistona australis</i>	Cabbage Tree Palm	15 x 3m						
<i>Melia azederach</i>	White Cedar	12 x 6m						
SMALL – MEDIUM TREES								
<i>Acacia implexa</i>	Hickory Wattle	10 x 4m						
<i>Acacia mearnsii</i>	Black Wattle	10 x 5m						
<i>Acmena smithii</i>	Lilly Pilly	10 x 5m						
<i>Allocasuarina littoralis</i>	Black She-Oak	8 x 5m						
<i>Callistemon salignus</i>	Willow Bottlebrush	6 x 4m						
<i>Elaeocarpus reticulatis</i>	Blueberry Ash	8 x 4m						
<i>Glochidion ferdinandi</i>	Cheese Tree	8 x 6m						
<i>Melaleuca alternifolia</i>	Tea Tree	6 x 4m						
<i>Melaleuca decora</i>	Feather Honey-Myrtle	6 x 4m						
<i>Melaleuca ericifolia</i>	Swamp Paperbark	4 x 3m						
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	8 x 4m						
<i>Melaleuca styphellioides</i>	Prickly-leaved Tea Tree	8 x 4m						
<i>Rapanea variabilis</i>	Muttonwood	8 x 4m						
<i>Streblus brunonianus</i>	Whalebone Tree	10 x 4m						
SHRUBS								
<i>Acacia falcata</i>	Falcate Wattle	3 x 2m						
<i>Acacia stricta</i>	Straight Wattle	3 x 2m						
<i>Bursaria spinosa</i>	Black Thorn	4 x 3m						
<i>Daviesia ulicifolia</i>	Bitter Pea	2 x 2m						
<i>Dodonaea viscosa subsp. angustifolia</i>	Sticky Hop-bush	3 x 2m						
<i>Kunzea ambigua</i>	Tick Bush	3 x 2m						
<i>Ozothamnus diosmifolius</i>	Rice Flower	2 x 2m						
<i>Pultenaea retusa</i>	Bush Pea	2 x 2m						
<i>Pultenaea villosa</i>	Bush Pea	2 x 2m						
GRASSES & GROUNDCOVERS								
<i>Aristida vagans</i>	Three Awn Grass	1 x 1m						
<i>Carex appressa</i>	Tall Sedge	1 x 1m						
<i>Commelina cyanea</i>	Native Wondering Jew	Prostrate						
<i>Dianella longifolia</i>	Flax-Lily	1 x 1m						
<i>Dianella revoluta</i>	Blue Flax-Lily	1 x 1m						
<i>Dichondra repens</i>	Kidney Weed	Prostrate						
<i>Gahnia clarkei</i>	Tall Saw-sedge	2 x 1m						
<i>Goodenia hederacea subsp. hederacea</i>	Forest Goodenia	1 x 1m						
<i>Imperata cylindrica</i>	Blady Grass	1 x 1m						
<i>Lomandra longifolia</i>	Spiny-headed Mat Rush	1 x 1m						
<i>Microlaena stipoides</i>	Weeping Grass	0.7 x 0.7m						
<i>Oplismenus imbecillis</i>	Basket Grass	0.3 x 0.3m						
<i>Paspalidium distans</i>		0.7 x 0.7m						
<i>Poa labillardieri</i>	Large Tussock Grass	1 x 1m						
<i>Themeda australis</i>	Kangaroo Grass	1 x 1m						
SEDGES & RUSHES								
<i>Baumea juncea</i>	Twig-rush	1 x 1m						
<i>Eleocharis sphacelata</i>	Tall Spike-rush	2 x 2m						
<i>Juncus kraussii</i>	Sea Rush	1.5 x 1.5m						
<i>Ficinia nodosa</i>	Knobby Club-rush	1 x 1m						
<i>Phragmites australis</i>	Common Reed	5 x 2m						
<i>Schoenoplectus validus</i>	River Club-rush	3 x 2m						
<i>Selliera radicans</i>	Swamp Weed	Prostrate						



3.5.2 LAKE ILLAWARRA FORESHORE PRECINCT OPEN SPACE



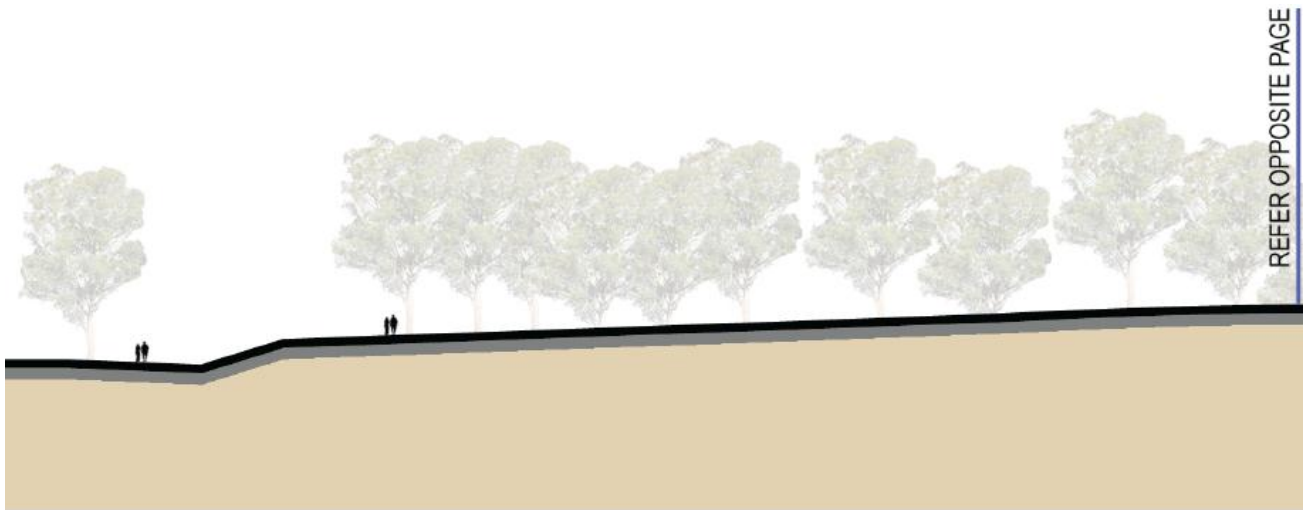
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| <ul style="list-style-type: none"> EXISTING + PROPOSED GRASS EXISTING TREE COVER RETAINED PROPOSED TREE PLANTING PEDESTRIAN AND/OR CYCLE PATH (OFF ROAD) PEDESTRIAN ONLY PATH (OFF ROAD) STORMWATER BASIN / POND / DRAINAGE CHANNEL | <ul style="list-style-type: none"> 1 Industrial Employment Precinct 2 Tourism - TBC 3 Informal Recreation 4 Criterium Cycle Track 5 Car park 6 Proposed water quality pond 7 Existing settling ponds retained | <ul style="list-style-type: none"> 8 Spectator mound for Criterium track 9 Lookout 10 Foreshore open space 11 Pedestrian trail with midden interpretive signage 12 Midden site 13 Spine Road 14 Duck Creek |
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LAKE ILLAWARRA RESERVE MASTERPLAN
TALLAWARRALANDS

DWG NO: LC-10-004-0201
DATE: DECEMBER 2010





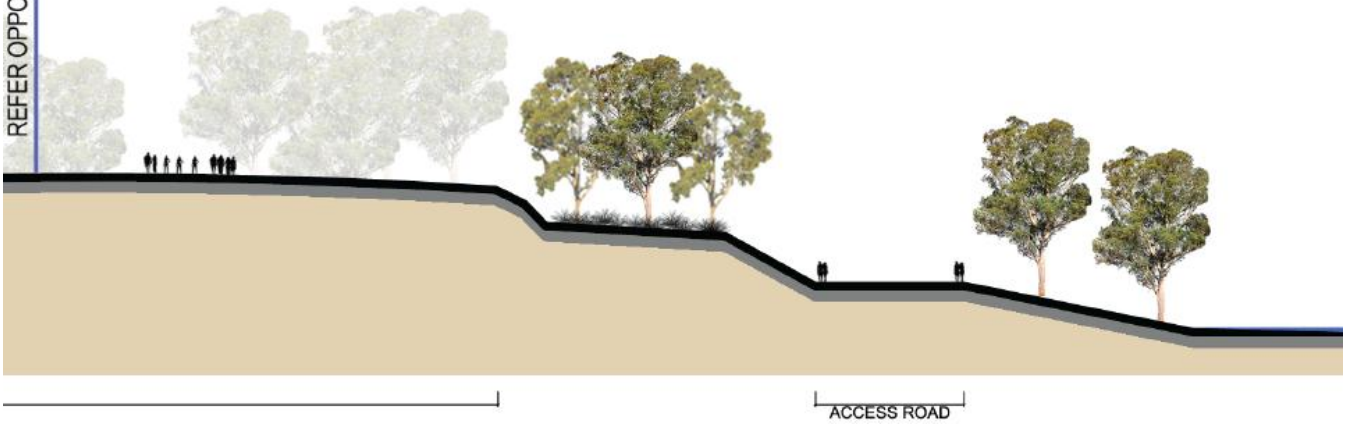
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SECTION AA



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PLANTING STRATEGY

The Lake Illawarra Foreshore Precinct stretches from Yallah Bay Road to the mouth of Duck Creek, and includes both natural soil conditions and areas of ash disposal. As a result, a number of open space 'zones' have been identified to reflect the variation in growing conditions and proposed open space uses. These 'zones' are described below and illustrated on the following page. A schedule of species considered suitable for use in each zone is presented on the subsequent page.

OPEN SPACE ZONE	SUMMARY DESCRIPTION	PLANTING STRATEGY
Zone 1 – Criterion Circuit and Surrounding Open Space	<ul style="list-style-type: none"> Located on former ash dams Asbestos repository mound in north west corner Currently supports a high density of noxious weeds Swamp Oak regrowth covers substantial areas Drainage varies from fair to poor 	<ul style="list-style-type: none"> Provide recreation and amenity value to proposed criterion cycle circuit and surrounding open space areas Enhance ecological diversity values
Zone 2 – Foreshore Open Space	<ul style="list-style-type: none"> Currently supports a high density of noxious weeds Contains small area of the Endangered Ecological Community <i>Coastal Saltmarsh</i> Duck Creek alluvium soils Drainage variable 	<ul style="list-style-type: none"> Provide recreation and amenity value to foreshore open space areas Conservation and management of remnant <i>Coastal Saltmarsh</i> Enhance ecological diversity values
Zone 3 – Duck Creek Corridor	<ul style="list-style-type: none"> Adjoins revegetation of Duck Creek Corridor in accordance with Vegetation Management Plan recommendations (Eco Logical Australia 2010) Subject to periodic flooding 	<ul style="list-style-type: none"> Tree planting to increase ecological diversity within corridor





FIGURE 25 – OPEN SPACE ZONES WITHIN THE LAKE ILLAWARRA FORESHORE PRECINCT



PLANT SCHEDULE

BOTANICAL NAME	COMMON NAME	MATURE HEIGHT x WIDTH	ZONE		
			1	2	3
LARGE TREES					
<i>Acacia maidenii</i>	Maiden's Wattle	14 x 6m			
<i>Casuarina glauca</i>	Swamp Oak	15 x 6m			
<i>Corymbia maculata</i>	Spotted Gum	25 x 9m			
<i>Eucalyptus amplifolia</i>	Cabbage Gum	25 x 9m			
<i>Eucalyptus botryoides</i>	Bangalay	25 x 9m			
<i>Eucalyptus longifolia</i>	Woollybutt	20 x 9m			
<i>Eucalyptus resinifera</i> subsp. <i>hemilampra</i>	Red Mahogany	20 x 9m			
<i>Eucalyptus robusta</i>	Swamp Mahogany	20 x 9m			
<i>Eucalyptus tereticornis</i>	Forest Red Gum	20 x 9m			
<i>Livistona australis</i>	Cabbage Palm	15 x 3m			
<i>Lophostemon suaveolens</i>	Swamp Turpentine	16 x 6m			
SMALL – MEDIUM TREES					
<i>Acacia irrorata</i>	Green Wattle	10 x 5m			
<i>Acmena smithii</i>	Lilly Pilly	10 x 5m			
<i>Callistemon salignus</i>	Sweet Willow Bottlebrush	6 x 4m			
<i>Elaeocarpus reticulatus</i>	Blueberry Ash	8 x 4m			
<i>Melaleuca alternifolia</i>	Tea Tree	6 x 4m			
<i>Melaleuca decora</i>	Feather Honey-Myrtle	6 x 4m			
<i>Melaleuca ericifolia</i>	Swamp Paperbark	4 x 3m			
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	8 x 4m			
<i>Melaleuca styphelioides</i>	Prickly-leafed Tea Tree	8 x 4m			
<i>Rapanea variabilis</i>	Mutton Wood	8 x 4m			
<i>Streblus brunonianus</i>	Whalebone Tree	10 x 4m			
SHRUBS					
<i>Acacia falcata</i>	Falcate Wattle	3 x 2m			
<i>Acacia longifolia</i>	Golden Wattle	3 x 2m			
<i>Daviesia ulicifolia</i>	Bitter Pea	2 x 2m			
<i>Dodonaea triquetra</i>	Large-leaf Hop-bush	2 x 2m			
<i>Kunzea ambigua</i>	Tick Bush	3 x 2m			
<i>Leptospermum polygalifolium</i>	Tantoon	3 x 2m			
<i>Melaleuca sieberi</i>	Sieber's Paperbark	4 x 3m			
<i>Myoporum acuminatum</i>	Boobiella	4 x 3m			
<i>Ozothamnus diosmifolius</i>	Rice Flower	2 x 2m			
GRASSES & GROUNDCOVERS					
<i>Aristida vagans</i>	Three Awn Grass	1 x 1m			
<i>Carex appressa</i>	Tall Sedge	1 x 1m			
<i>Commelina cyanea</i>	Native Wondering Jew	Prostrate			
<i>Dianella longifolia</i>	Flax-Lily	1 x 1m			
<i>Dianella revoluta</i>	Blue Flax-Lily	1 x 1m			
<i>Dichondra repens</i>	Kidney Weed	Prostrate			
<i>Entolasia marginata</i>	Bordered Panic	1 x 1m			
<i>Gahnia clarkii</i>	Tall Saw-sedge	2 x 1m			
<i>Goodenia hederacea</i> subsp. <i>hederacea</i>	Forest Goodenia	1 x 1m			
<i>Hypolepis muelleri</i>	Harsh Ground Fern	1 x 1m			
<i>Imperata cylindrica</i>	Blady Grass	1 x 1m			
<i>Lomandra longifolia</i>	Spiny-headed Mat Rush	1 x 1m			
<i>Microlaena stipoides</i>	Weeping Grass	0.7 x 0.7m			
<i>Oplismenus imbecillis</i>	Basket Grass	0.3 x 0.3m			
<i>Paspalidium distans</i>		0.7 x 0.7m			
<i>Poa labillardieri</i>	Large Tussock Grass	1 x 1m			
<i>Pteridium esculentum</i>	Common Bracken	1 x 1m			
<i>Themeda australis</i>	Kangaroo Grass	1 x 1m			
<i>Viola hederacea</i>	Ivy-leafed Violet	Prostrate			
SEDGES & RUSHES					
<i>Juncus kraussii</i>	Sea Rush	1.5 x 1.5m			
<i>Selliera radicans</i>	Swamp Weed	Prostrate			



3.5.3 SOUTHERN PRECINCT OPEN SPACE



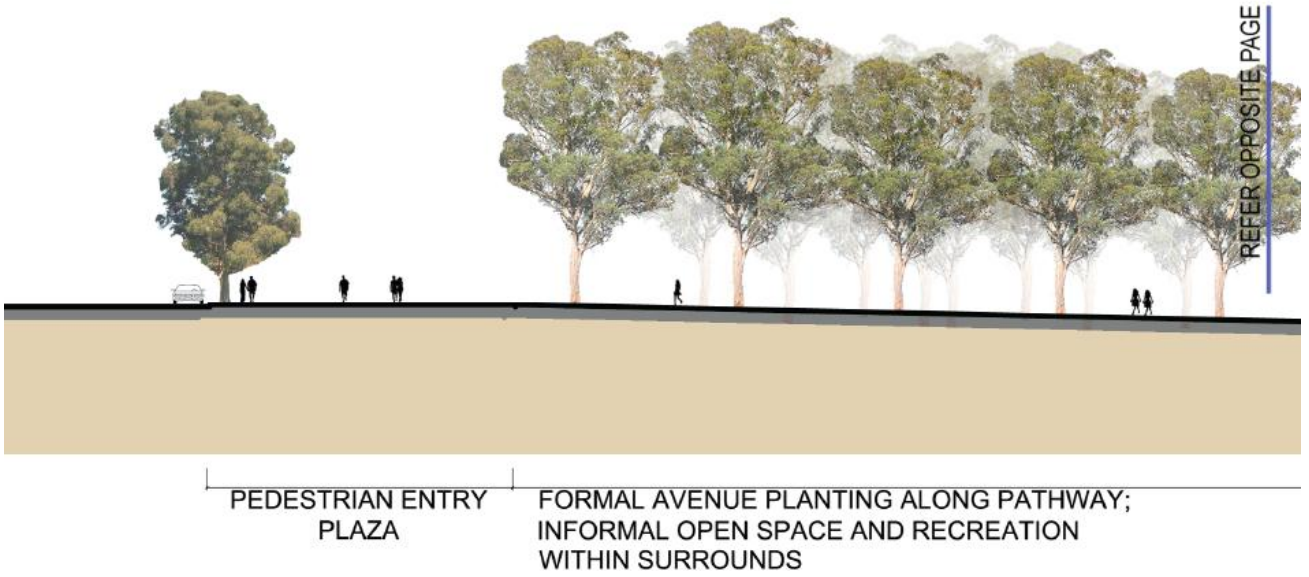
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SOUTHERN LAKES RESERVE PLAN
TALLAWARRA LANDS

DWG NO: LC-10-004-0301
DATE: DECEMBER 2010



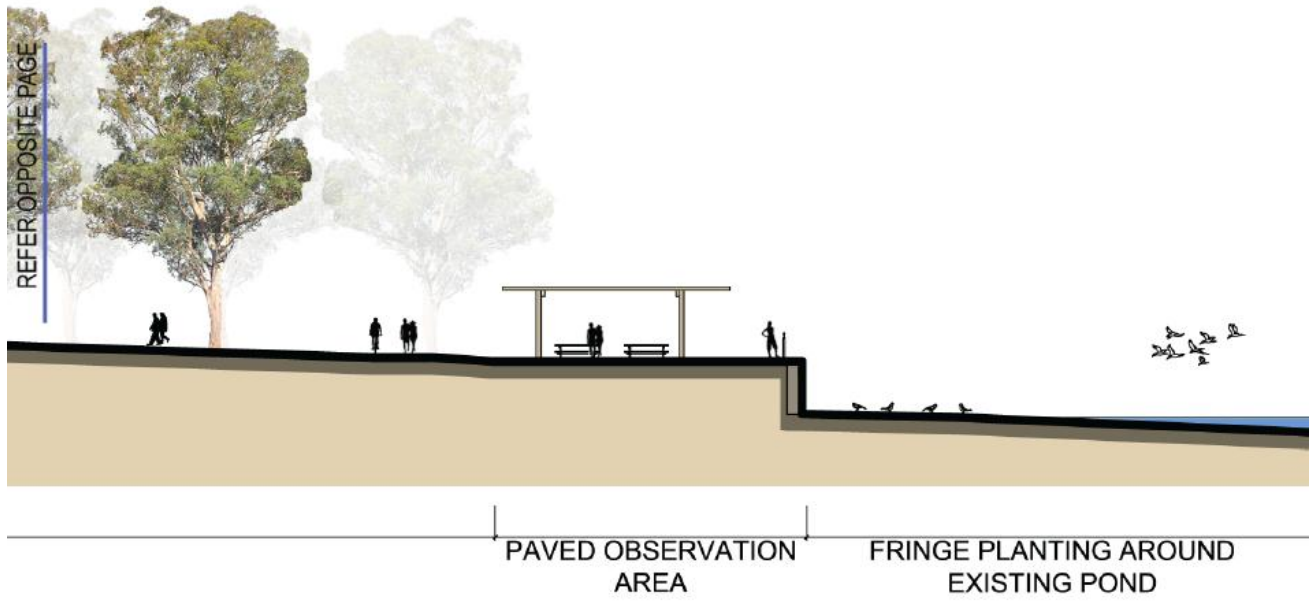
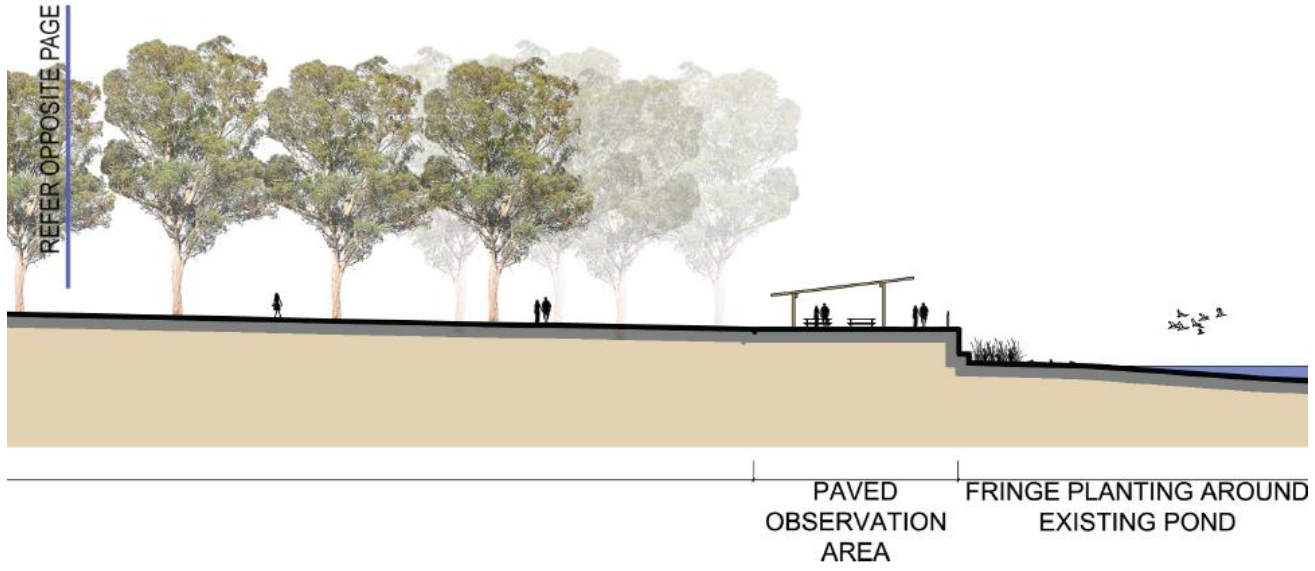


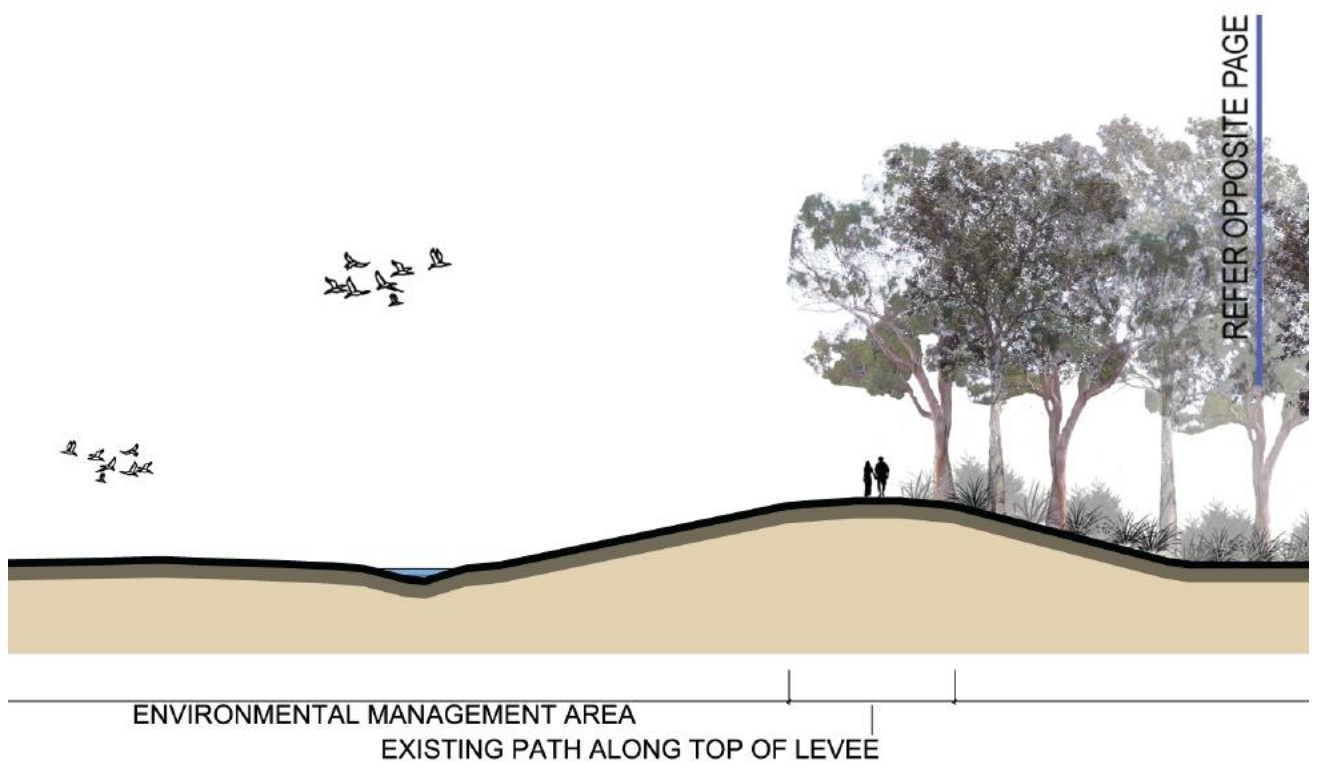
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SECTION BB





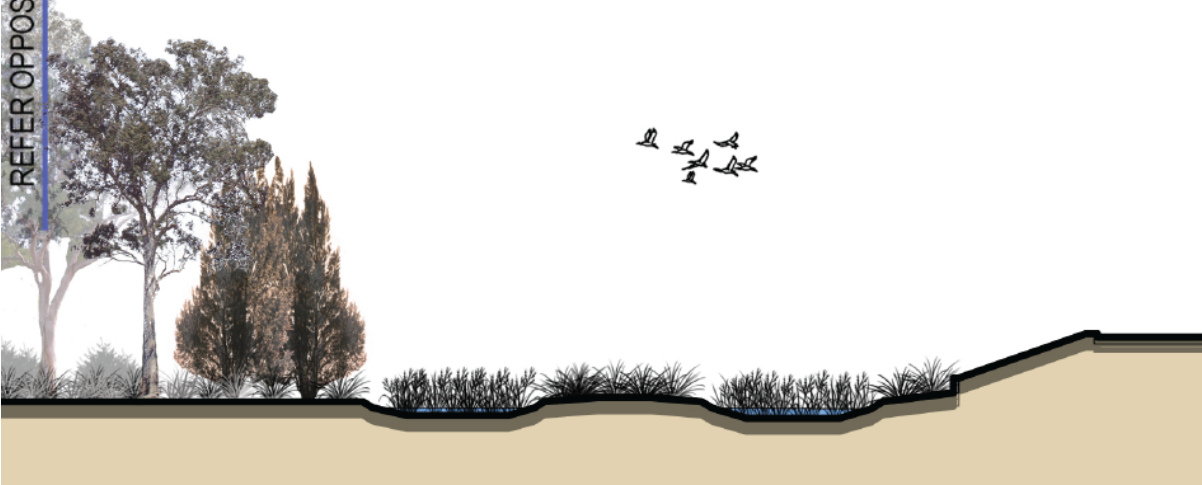


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WOODLAND SCREENING VEGETATION

EXISTING DRAINAGE LINES RETAINED

HAYWARDS BAY BEYOND



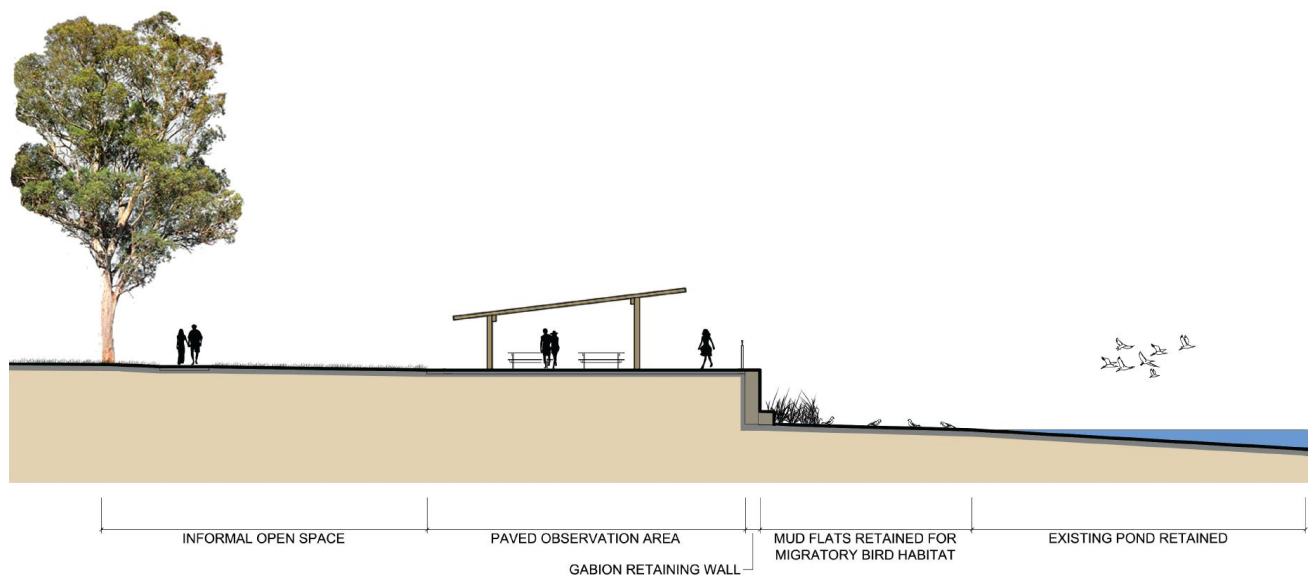
In order to minimise the potential disturbance of migratory birds using the lake as habitat the landscape concept provides for the creation of a range of edge treatments. The design objective is to allow limited public access to designated points from which the lake and birds can be observed from an elevated lookout area while precluding public access to other sections of lake edge.

Development of the three lake edger treatments will allow the ecological values of the existing lake to be protected while providing a distinctive experience in the adjoining open space and recreation areas. The lake edge treatments include:

Edge Treatment 1 provides for the development of lookout points from which the water surface and mudflats of the lake can be observed. A gabion retaining wall will elevate viewers above the level of the mudflats, increasing views of the lakes and minimising potential disturbance of the migratory birds.

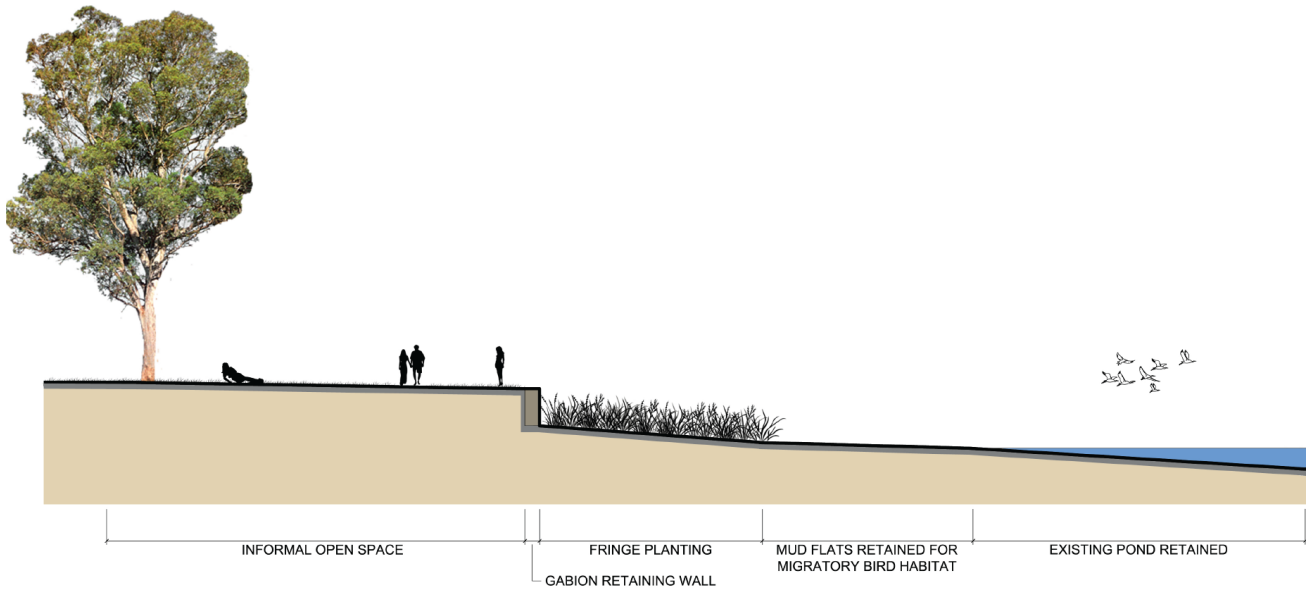
Edge Treatment 2 provides for the creation of areas of turf above a strip of macrophyte planting around the lake edge. A gabion retaining wall will provide the necessary separation between the turf recreation areas and the mudflat habitat.

Edge Treatment 3 provides clear separation of recreation areas from ecological habitat values associated with the lake and mudflats. In this edge treatment planting will include shrubs along the top a mound to prevent pedestrian access to the mudflats of the lake edge and potential disturbance of the migratory birds.

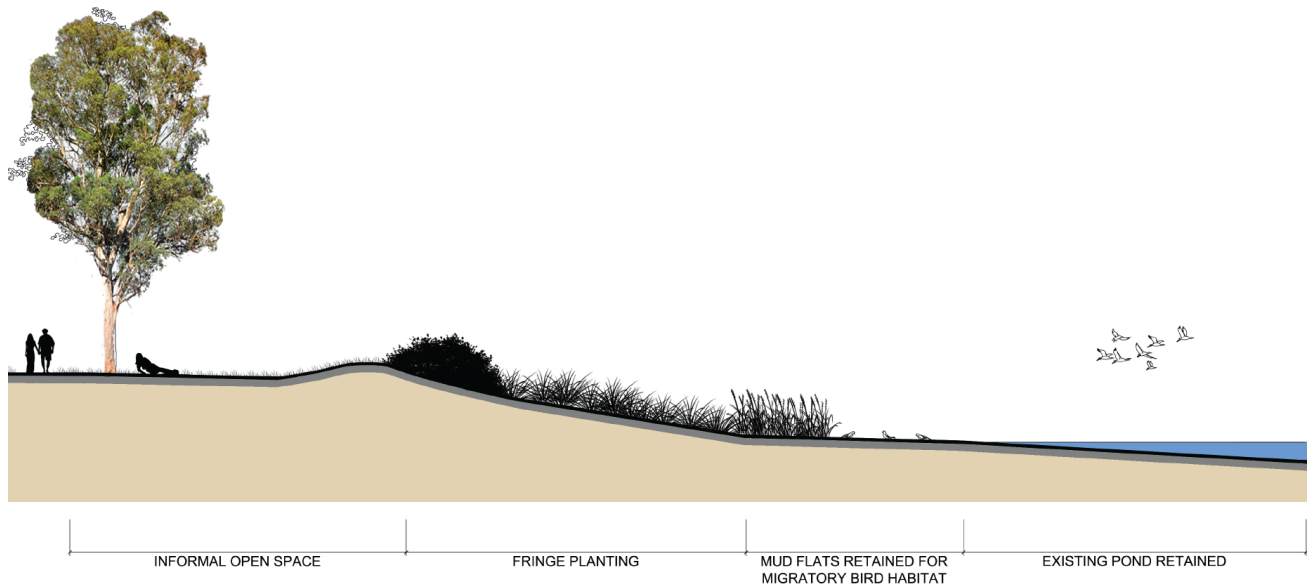


EDGE TREATMENT 1





EDGE TREATMENT 2



EDGE TREATMENT 3



PLANTING STRATEGY

The Southern Precinct open space includes both natural soil conditions and extensive areas of ash deposition. As a result, a number of open space 'zones' have been identify within the Precinct that reflect particular site conditions and proposed land uses to ensure the planting strategy responds to particular site conditions. These 'zones' are described below and shown on Figure 26. A schedule of species suitable for use in each zone is presented on the subsequent page.

OPEN SPACE ZONE	SUMMARY DESCRIPTION	PLANTING STRATEGY
Zone 1 – South Western Boundary	<ul style="list-style-type: none"> Undulating topography along western boundary of the Tallawarra project site Sandy clay soils Generally well drained 	<ul style="list-style-type: none"> Provide recreation and amenity value to open space areas Tree and understorey planting along boundary to reinforce screening from the adjoining Princes Highway Planting along the boundary with residential properties to be designed to create a 'nil hazard' for bushfire management
Zone 2 – Open Space Adjoining Ponds	<ul style="list-style-type: none"> Located on former ash dams with moderately steep embankments 	<ul style="list-style-type: none"> Ponds in western portion to be retained for amenity and habitat value Provide recreation and amenity value to open space areas Water body with adjoining mudflats and <i>Coastal Saltmarsh</i> Planting along the boundary with residential properties to be designed to create a 'nil hazard' for bushfire management
Zone 3 – Drainage Line / Boundary Planting	<ul style="list-style-type: none"> Levee embankment created as part of former ash dams Existing drainage lines to be retained 	<ul style="list-style-type: none"> Tree and understorey planting along southern boundary to screen drainage line and adjoining residential development
Zone 4 – Environmental Management Area	<ul style="list-style-type: none"> Existing ponds to be retained Designated revegetation zone 	<ul style="list-style-type: none"> Revegetation of pond fringe in accordance with Vegetation Management Plan recommendations (Eco Logical Australia 2010)





FIGURE 26 – OPEN SPACE ZONES OF THE SOUTHERN PRECINCT



PLANT SCHEDULE

BOTANICAL NAME	COMMON NAME	MATURE HEIGHT x WIDTH	ZONE			
			1	2	3	4
LARGE TREES						
<i>Angophora floribunda</i>	Rough-Barked Apple	20 x 9m				
<i>Brachychiton populneus</i>	Kurrajong	15 x 8m				
<i>Casuarina glauca</i>	Swamp Oak	15 x 6m				
<i>Corymbia maculata</i>	Spotted Gum	25 x 9m				
<i>Eucalyptus amplifolia</i>	Cabbage Gum	25 x 9m				
<i>Eucalyptus bosistoana</i>	Coastal Grey Box	25 x 9m				
<i>Eucalyptus botryoides</i>	Bangalay	25 x 9m				
<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark	25 x 9m				
<i>Eucalyptus longifolia</i>	Woollybutt	20 x 9m				
<i>Eucalyptus robusta</i>	Swamp Mahogany	20 x 9m				
<i>Eucalyptus pilularis</i>	Blackbutt	20 x 9m				
<i>Eucalyptus tereticornis</i>	Forest Red Gum	20 x 9m				
<i>Glochidion sumatranum</i>	Umbrella Cheese Tree	12 x 4m				
<i>Livistona australis</i>	Cabbage Tree Palm	15 x 3m				
SMALL – MEDIUM TREES						
<i>Acacia implexa</i>	Hickory Wattle	10 x 4m				
<i>Acacia mearnsii</i>	Black Wattle	10 x 5m				
<i>Allocasuarina littoralis</i>	Black She-Oak	8 x 5m				
<i>Callistemon salignus</i>	Willow Bottlebrush	6 x 4m				
<i>Melaleuca decora</i>	Feather Honey-Myrtle	6 x 4m				
<i>Melaleuca ericifolia</i>	Swamp Paperbark	4 x 3m				
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	8 x 4m				
<i>Melaleuca styphelloides</i>	Prickly-leaved Tea Tree	8 x 4m				
SHRUBS						
<i>Acacia falcata</i>	Falcate Wattle	3 x 2m				
<i>Acacia stricta</i>	Straight Wattle	3 x 2m				
<i>Bursaria spinosa</i>	Black Thorn	4 x 3m				
<i>Daviesia ulicifolia</i>	Bitter Pea	2 x 2m				
<i>Dodonaea viscosa</i> subsp. <i>angustifolia</i>	Sticky Hop-bush	3 x 2m				
<i>Kunzea ambigua</i>	Tick Bush	3 x 2m				
<i>Ozothamnus diosmifolius</i>	Rice Flower	2 x 2m				
GRASSES & GROUNDCOVERS						
<i>Aristida vagans</i>	Three Awn Grass	1 x 1m				
<i>Carex appressa</i>	Tall Sedge	1 x 1m				
<i>Commelina cyanea</i>	Native Wandering Jew	Prostrate				
<i>Dianella longifolia</i>	Flax-Lily	1 x 1m				
<i>Dianella revoluta</i>	Blue Flax-Lily	1 x 1m				
<i>Dichondra repens</i>	Kidney Weed	Prostrate				
<i>Gahnia clarkei</i>	Tall Saw-sedge	2 x 1m				
<i>Goodenia hederacea</i> subsp. <i>hederacea</i>	Forest Goodenia	1 x 1m				
<i>Hardenbergia violacea</i>	False Sarsaparilla	0.5 x 0.5m				
<i>Hypolepis muelleri</i>	Harsh Ground Fern	0.5 x 0.5m				
<i>Imperata cylindrica</i>	Blady Grass	1 x 1m				
<i>Lomandra longifolia</i>	Spiny-headed Mat Rush	1 x 1m				
<i>Microlaena stipoides</i>	Weeping Grass	0.7 x 0.7m				
<i>Oplismenus imbecillis</i>	Basket Grass	0.3 x 0.3m				
<i>Paspalidium distans</i>		0.7 x 0.7m				
<i>Persicaria decipiens</i>	Slender knotweed	1 x 1m				
<i>Poa labillardieri</i>	Large Tussock Grass	1 x 1m				
<i>Themeda australis</i>	Kangaroo Grass	1 x 1m				



3.5.4 NORTHERN PRECINCT OPEN SPACE



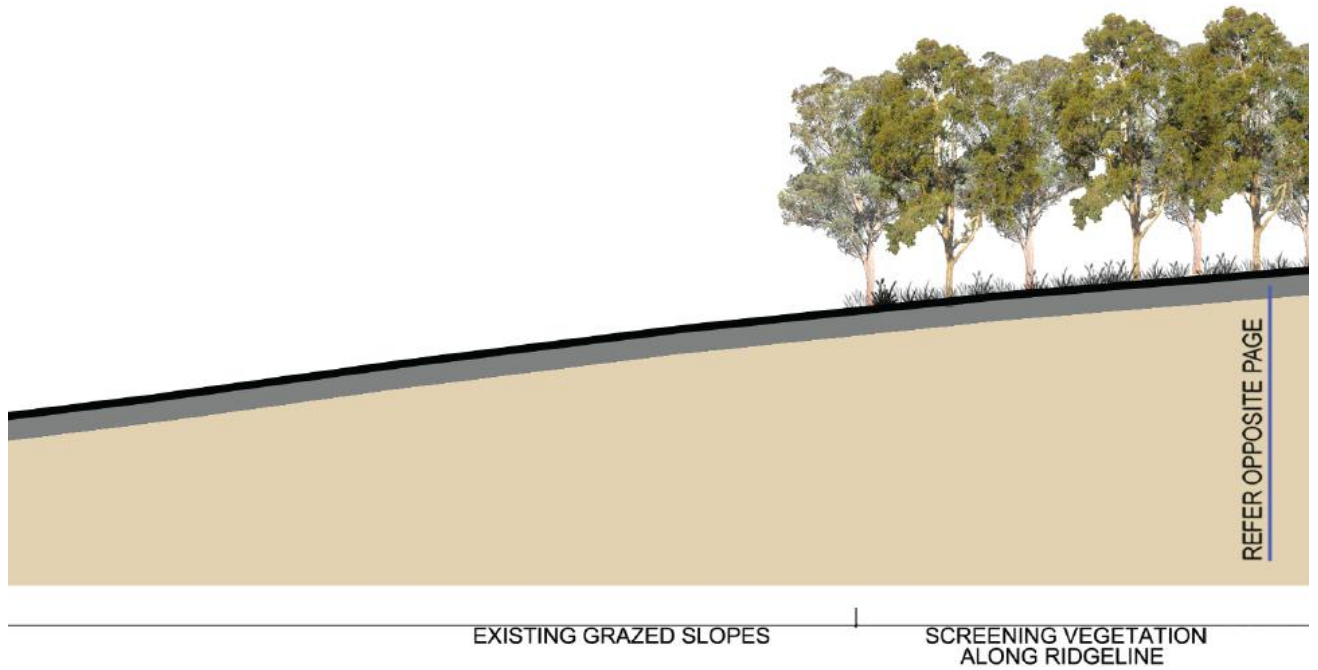
LEGEND

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> EXISTING + PROPOSED GRASS EXISTING TREE COVER RETAINED PROPOSED TREE PLANTING PEDESTRIAN AND/OR CYCLE PATH (OFF ROAD) PEDESTRIAN ONLY PATH (OFF ROAD) STORMWATER BASIN / POND / DRAINAGE CHANNEL | <ul style="list-style-type: none"> 1 Northern Residential Precinct 2 Lookout with BBQ / picnic facilities 3 Foreshore open space with scattered planting 4 Jetty proposed by Foreshore Masterplan 5 Woodland screen planting 6 Shared pedestrian/cycle path along foreshore | <ul style="list-style-type: none"> 7 Connection to Koonawarra and beyond 8 Existing Gilba Road reserve retained 9 High voltage power line easement 10 Dense tree planting proposed by Lake Illawarra Foreshore Authority Masterplan |
|---|---|---|

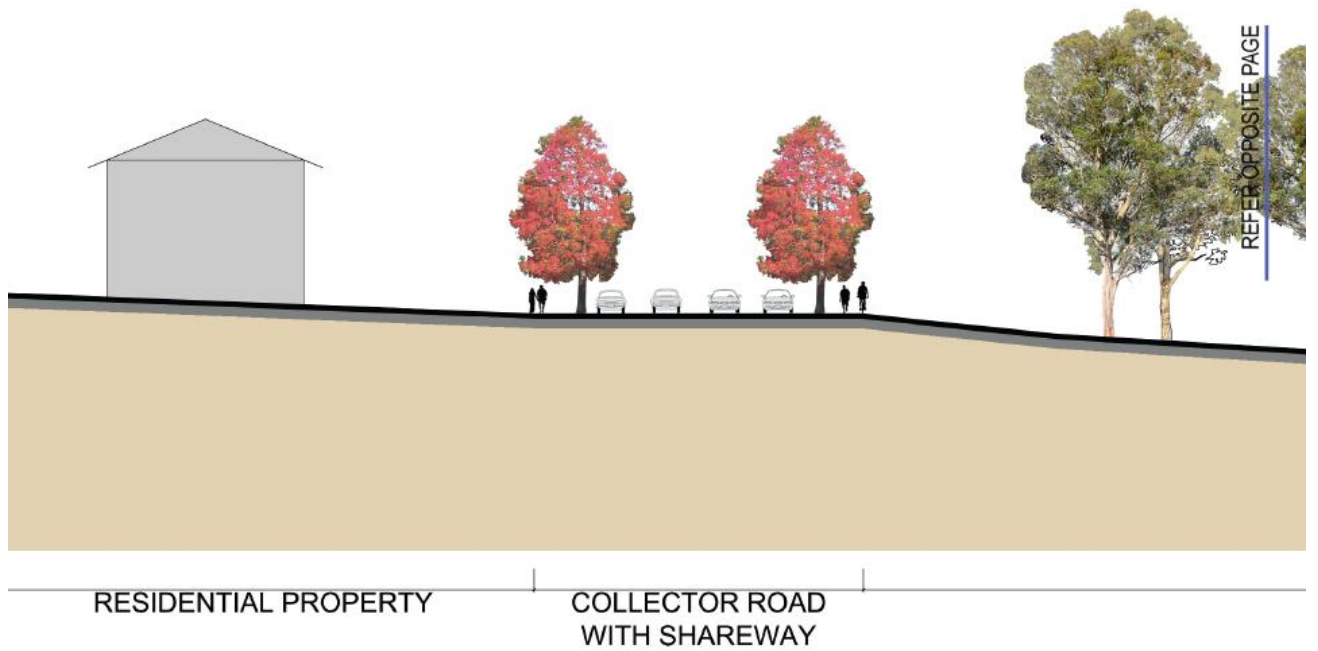
NORTH FORESHORE PLAN
TALLAWARRA LANDS

DWG NO: LC-10-004-0401
DATE: DECEMBER 2010



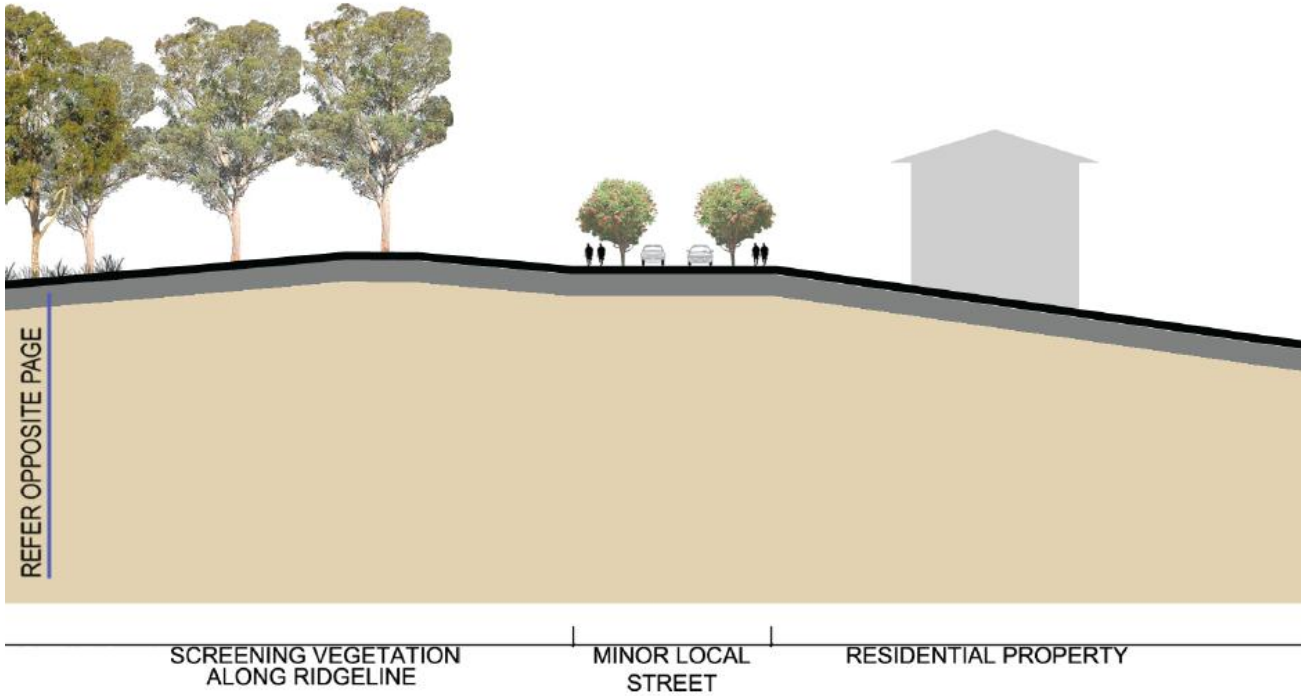


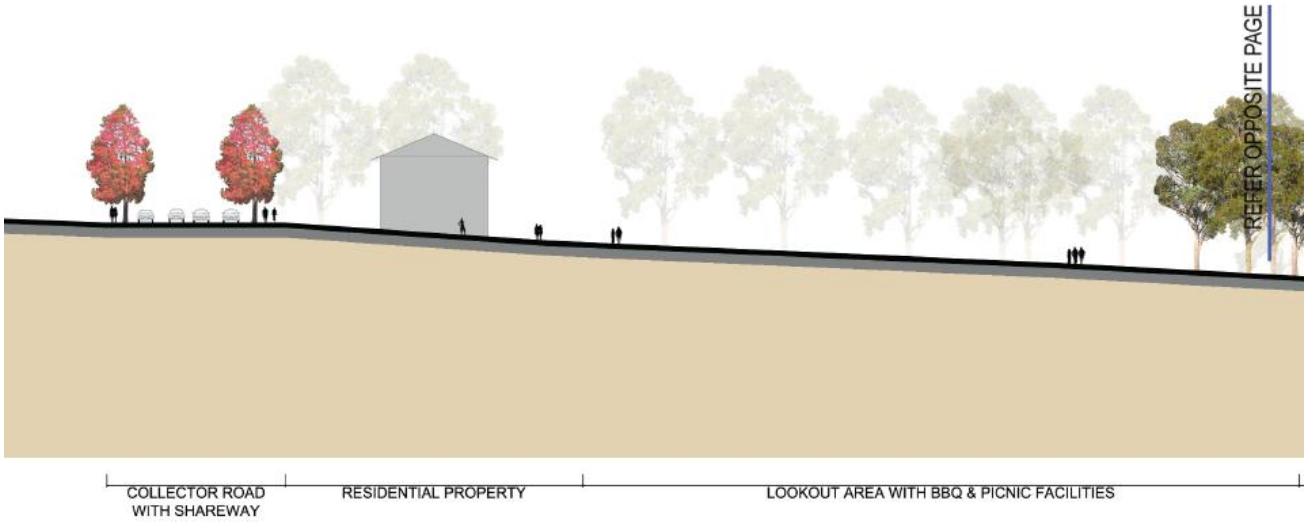
SECTION AA



SECTION BB







SECTION CC





PLANTING STRATEGY

The Northern Precinct includes predominantly natural soil conditions with minimal fill material present. A number of open space 'zones' have been identify to reflect particular growing conditions and proposed open space uses. These 'zones' are described below and shown on Figure 27 on the following page. A schedule of species recommended for use in each zone is presented on the subsequent page.

OPEN SPACE ZONE	SUMMARY DESCRIPTION	PLANTING STRATEGY
Zone 1 – Northern Ridgeline	<ul style="list-style-type: none"> · Predominantly cleared grazing land · Exposed midslopes of Mt Brown · Heavy brown clay soils · Well drained 	<ul style="list-style-type: none"> - Tree and understorey planting along ridgeline adjoin residential property to provide visual and acoustic screening from Tallawarra Power Station - Planting along the boundary with residential properties to be designed to create a 'nil hazard' for bushfire management
Zone 2 – Tallawarra Point Open Space	<ul style="list-style-type: none"> · Predominantly cleared grazing land · Exposed lower slopes of Mt Brown · Light brown clay soils 	<ul style="list-style-type: none"> - Provide recreation and amenity value to open space areas including planting for shade and wind protection
Zone 3 – L.I.F.A Foreshore Masterplan	<ul style="list-style-type: none"> · Sloping ground along lake foreshore with scattered remnant vegetation and recent planting 	<ul style="list-style-type: none"> - Provide recreation and amenity value to open space areas including planting for shade and wind protection - Conservation and management of remnant <i>Coastal Saltmarsh</i> - Planting along the boundary with residential properties to be designed to create a 'nil hazard' for bushfire management





FIGURE 27 – OPEN SPACE ZONES OF THE NORTH FORESHORE RESERVE



PLANT SCHEDULE

BOTANICAL NAME	COMMON NAME	MATURE HEIGHT x WIDTH	ZONE		
			1	2	3
LARGE TREES					
<i>Acacia maidenii</i>	Maiden's Wattle	14 x 6m			
<i>Angophora floribunda</i>	Rough-Barked Apple	20 x 9m			
<i>Casuarina glauca</i>	Swamp Oak	15 x 6m			
<i>Corymbia maculata</i>	Spotted Gum	25 x 9m			
<i>Eucalyptus ampifolia</i>	Cabbage Gum	25 x 9m			
<i>Eucalyptus bosistoana</i>	Coastal Grey Box	25 x 9m			
<i>Eucalyptus botryooides</i>	Bangalay	25 x 9m			
<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark	25 x 9m			
<i>Eucalyptus longifolia</i>	Woollybutt	20 x 9m			
<i>Eucalyptus saligna</i>	Sydney Blue Gum	20 x 9m			
<i>Eucalyptus tereticornis</i>	Forest Red Gum	20 x 9m			
<i>Ficus sp.</i>	-	20 x 15m			
SMALL – MEDIUM TREES					
<i>Acacia meamsii</i>	Black Wattle	10 x 5m			
<i>Acmena smithii</i>	Lilly Pilly	10 x 5m			
<i>Allocasuarina littoralis</i>	Black She-Oak	8 x 5m			
<i>Callistemon salignus</i>	Willow Bottlebrush	6 x 4m			
<i>Melaleuca decora</i>	Feather Honey-Myrtle	6 x 4m			
<i>Melaleuca ericifolia</i>	Swamp Paperbark	4 x 3m			
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	8 x 4m			
<i>Melaleuca styphelloioides</i>	Prickly-leaved Tea Tree	8 x 4m			
<i>Myoporum acuminatum</i>	Boobialla				
<i>Rapanea variabilis</i>	Mutton Wood	8 x 4m			
<i>Streblus brunonianus</i>	Whalebone Tree	10 x 4m			
SHRUBS					
<i>Acacia falcata</i>	Falcate Wattle	3 x 2m			
<i>Acacia stricta</i>	Straight Wattle	3 x 2m			
<i>Bursaria spinosa</i>	Black Thorn	4 x 3m			
<i>Daviesia ulicifolia</i>	Bitter Pea	2 x 2m			
<i>Dodonaea viscosa</i> subsp. <i>angustifolia</i>	Sticky Hop-bush	3 x 2m			
<i>Kunzea ambigua</i>	Tick Bush	3 x 2m			
<i>Ozothamnus diosmifolius</i>	Rice Flower	2 x 2m			
CLIMBERS					
<i>Maclura cochinchinensis</i>	Cockspur Thorn	-			
<i>Pandorea pandorana</i>	Wonga Wonga Vine	-			
GRASSES & GROUNDCOVERS					
<i>Alternanthera denticulata</i>	Common Joy Weed	0.4 x 0.4m			
<i>Aristida vagans</i>	Three Awn Grass	1 x 1m			
<i>Atriplex australasica</i>	Green Softbush	0.4 x 0.4m			
<i>Carex appressa</i>	Tall Sedge	1 x 1m			
<i>Carex longibrachiata</i>	Bergalia Tussock	1 x 1m			
<i>Crinum pendunculatum</i>	Swamp Lily	2 x 2m			
<i>Dianella longifolia</i>	Flax-Lily	1 x 1m			
<i>Dianella revoluta</i>	Blue Flax-Lily	1 x 1m			
<i>Dichondra repens</i>	Kidney Weed	Prostrate			
<i>Entolasia marginata</i>		1 x 1m			
<i>Gahnia clarkei</i>	Tall Saw-sedge	2 x 1m			
<i>Gietonoplesium cymosum</i>	Scrambling Lilly	1 x 1m			
<i>Hardenbergia violacea</i>	False Sarsaparilla	0.5 x 0.5m			
<i>Lomandra longifolia</i>	Spiny-headed Mat Rush	1 x 1m			
<i>Microlaena stipoides</i>	Weeping Grass	0.7 x 0.7m			
<i>Oplismenus imbecillis</i>	Basket Grass	0.3 x 0.3m			
<i>Poa labillardieri</i>	Large Tussock Grass	1 x 1m			
<i>Themeda australis</i>	Kangaroo Grass	1 x 1m			
SEDGES & RUSHES					
<i>Baumea juncea</i>		1 x 1m			
<i>Juncus kraussii</i>	Sea Rush	1.5 x 1.5m			
<i>Phragmites australis</i>	Common Reed	5 x 2m			
<i>Selliera radicans</i>	Swamp Weed	Prostrate			



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4.0 Circulation

4.1 CIRCULATION PRINCIPLES

The Landscape Plan aims to provide an effective, safe and enjoyable pedestrian and cycle path network throughout the Tallawarra Lands development. The RTA's *NSW Bicycle Guidelines 2003* have been applied to planning the network, which include:

Coherence –

- The pedestrian/cycle path network is coherent and links popular destinations via both the open space and road network;
- The path network is continuous and clearly marked;
- Pedestrian and cycle movements are prioritised where the path network crosses roadways; and
- The quality and character of materials to be used are consistent throughout the entire pedestrian/cycle path network.

Directness –

- The pedestrian/cycle path network is as direct as safely possible, avoiding long detours;
- Routes avoid topographic constraints, such as steep climbs or descents, and avoid delays caused by long crossing times.

Safety –

- Intersections are designed to include the safe movement of pedestrian and cyclists;
- The design of routes as they pass destinations such as bus stops or the Neighbourhood Centre is to allow for the safe movement of users;
- Crime Prevention Through Environmental Design initiatives are implemented wherever possible.

Attractiveness –

- The pedestrian/cycle path network is integrated with its surrounding environment to enhance the experience of those using it;
- Clear signage is to mark routes and destination points; and
- Routes are to be well lit and remain open-to-view.

Comfort –

- A smooth surface is to be maintained; and
- Effective intersection design is to ensure the use of the pedestrian/cycle path network is convenient.



4.2 PEDESTRIAN / CYCLE NETWORK

The pedestrian and cycle network will provide a healthy, low cost and environmentally friendly form of recreation and transport throughout the Tallawarra Lands development. It will offer a flexible and low-impact alternative to motor vehicles, linking major destinations with residential and employment zones, and providing for the growing demand of recreational cycling.

A range of pedestrian and cycle paths will be provided that include:

- **Cycle lanes** – 1.5m wide cycle lanes provided on the road pavement between traffic and parking lanes, defined by line marking.
- **Shareways** – 2.5m wide pedestrian and cycle shared pathways that are either provided along the edge of the road reserve or within adjoining open space and recreation areas.
- **Footpaths** – 1.5m wide pedestrian paths provided along the edge of the road reserve or within open space and recreation areas.

The location and nature of these alternative pedestrian and cycle pathways are addressed in the following sections.



4.2.1 CYCLE LANES

The term 'cycle lane' refers to a dedicated lane, for cyclists only, designated as such on the road pavement that by line marking. The purpose of these on-road lanes is to provide a designated route for cycle transport that enables quick and efficient travel that is separate from the recreational cycling associated with shareways.

Examples of cycle lanes are shown below. The proposed location of cycle lanes within the Tallawarra Lands is shown of Figure 28.



EXAMPLE OF CYCLE LANES WITHIN THE ROADWAY

(Source: Roads and Traffic Authority, 2003)



EXAMPLE OF CYCLE LANES WITHIN THE ROADWAY

(Source: Roads and Traffic Authority, 2003)

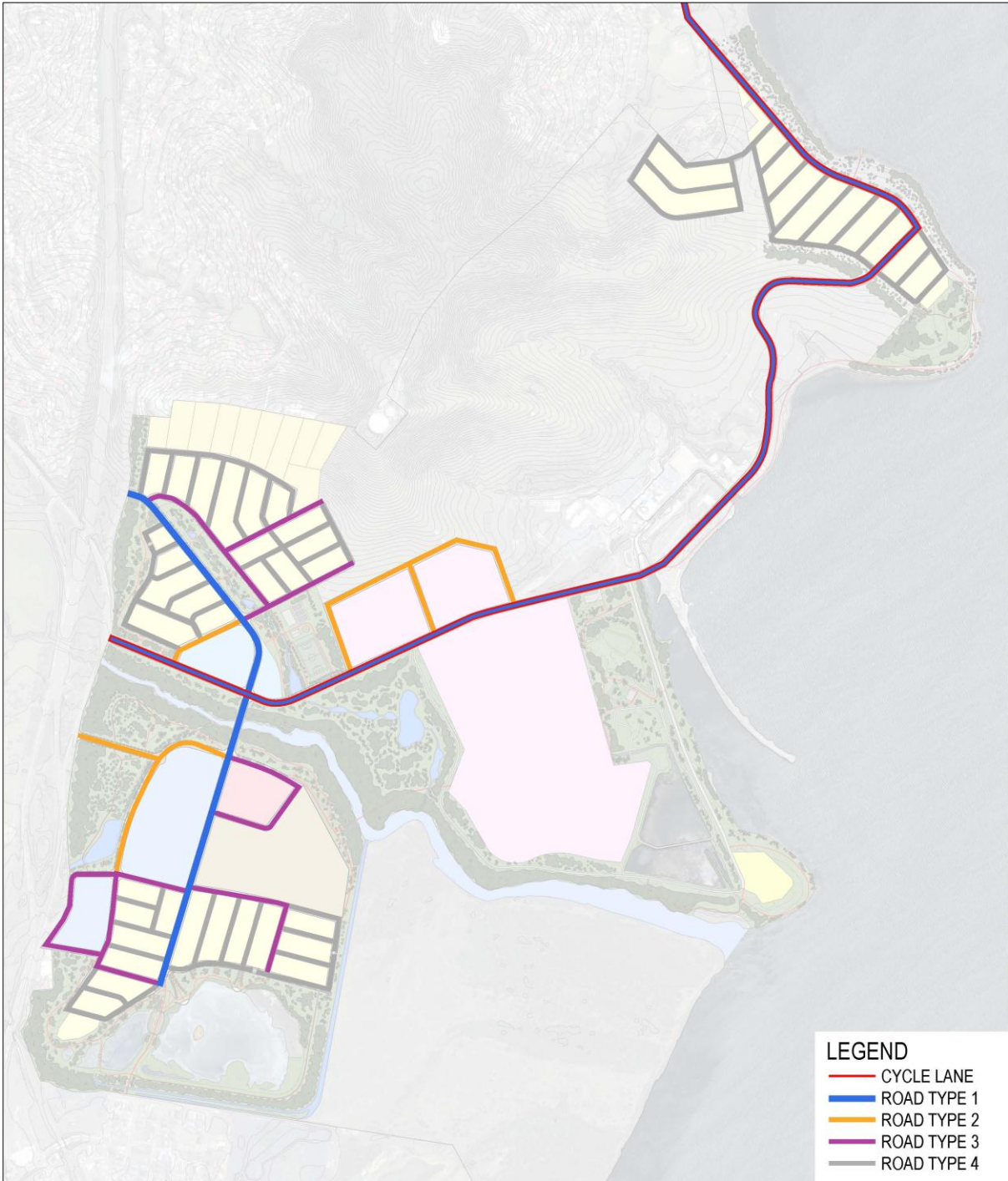


FIGURE 28 – CYCLE LANE ALIGNMENT



4.2.2 SHAREWAYS

'Shareways' are paths, typically 2.5m wide that are used by both pedestrians and cyclists. They are to be located along the edge of the road reserve or within open space and recreation areas. The purpose of the shareway is essentially to combine footpaths and cycle paths into off-road pathways that provide an interconnected network for recreational cycling and walking.

Examples of shareways are shown below. The proposed alignments of shareways throughout the Tallawarra Lands are shown of Figure 29.



EXAMPLES OF SHAREWAYS IN OPEN SPACE AREAS



EXAMPLE OF SHAREWAYS ALONG A ROAD RESERVE

(Source: Landcom, 2006)



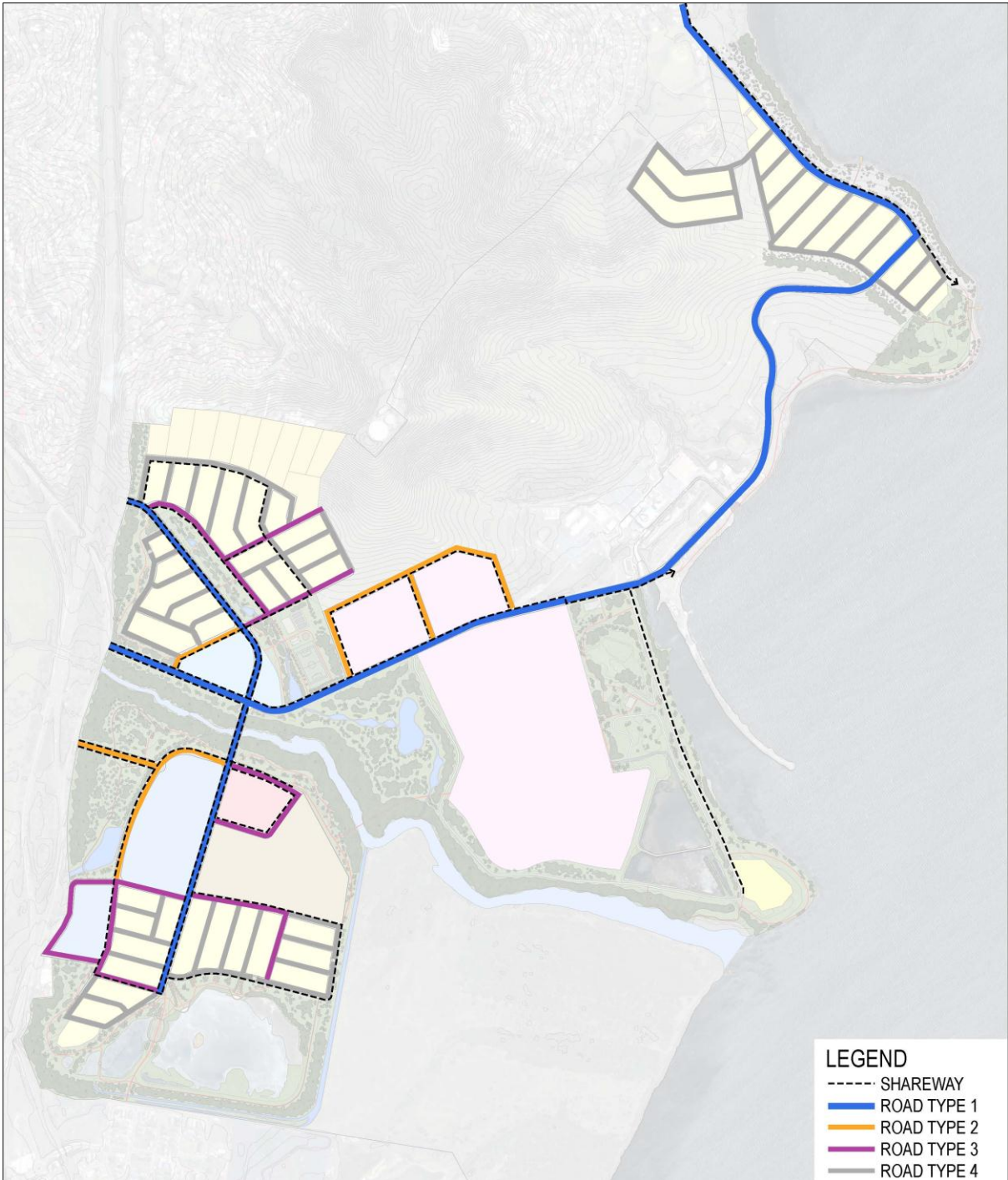


FIGURE 29 – SHAREWAY ALIGNMENT



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5.0 Streetscapes

5.1 INTRODUCTION

The role of streets can extend beyond their simple function as thoroughfares to influence the form and aesthetic quality of the public domain associated with streets. The size, arrangement and orientation of the street network influences the way in which residents and visitors perceive the urban environment in which they live, work and recreate.

The planning and design of streets throughout the Tallawarra Lands aims to create a coordinated landscape character that aids orientation, provides physical comfort (shade and wind protection) together with visual delight. An integrated strategy of street tree planting has been prepared that responds to the existing character of the site and seeks to create a clear identity and sense of place.

Water sensitive urban design initiatives and crime prevention through environmental design principles are also integrated into the planning and design of streetscapes, as illustrated on the following pages.



5.2 STREET HIERARCHY

The street hierarchy is designed to create a network that is connected, legible, easy to use and mindful of existing and proposed landscape features. The components of the street hierarchy are listed in the following table and illustrated on Figure 30.

ROAD TYPE	CARRIAGEWAY WIDTH	APPROPRIATE USE
ROAD TYPE 1 – Collector Street	12m	Collector streets link neighbourhoods together. They usually carry bus routes within as well as between neighbourhoods. Neighbourhood and local centres are usually located along these routes at intersections.
ROAD TYPE 2 – Industrial / Commercial Road	11.4m	Industrial / commercial roads provide a wider carriageway than that of local streets for the various vehicular thoroughfares associated with industrial and commercial employment areas.
ROAD TYPE 3 – Local Street	10.6m	Local streets provide access from collector streets to minor local streets. With a wider carriageway than that of minor local streets, Local Streets allow for bus routes and other vehicular thoroughfare.
ROAD TYPE 4 – Minor Local Street	7.5m	Minor local streets are the predominant street type within the development. Minor local streets have a limited use, used only where: <ul style="list-style-type: none"> - traffic volumes are low, and - there is low parking demand.

The following design principles, which are based on the Landcom *Street Design Guidelines*, have been adopted for the Tallawarra Lands development:

- **Developing a hierarchy** – Classifying streets according to their function to maximise accessibility and connectivity within the network.
- **Ensuring safe intersections** – Prioritising pedestrians to ensure a safe and convenient passage for all users.
- **Maximising landscape treatment in all streets** – Planting trees in all streets and retain existing trees where it is viable to do so, ensuring the landscape of each street is a reflection of its local context.
- **Implementing Water Sensitive Urban Design** – Applying WSUD measures such as bio-swales and bio-retention tree pits to treat stormwater and maximise the visual and recreational amenity of the development.



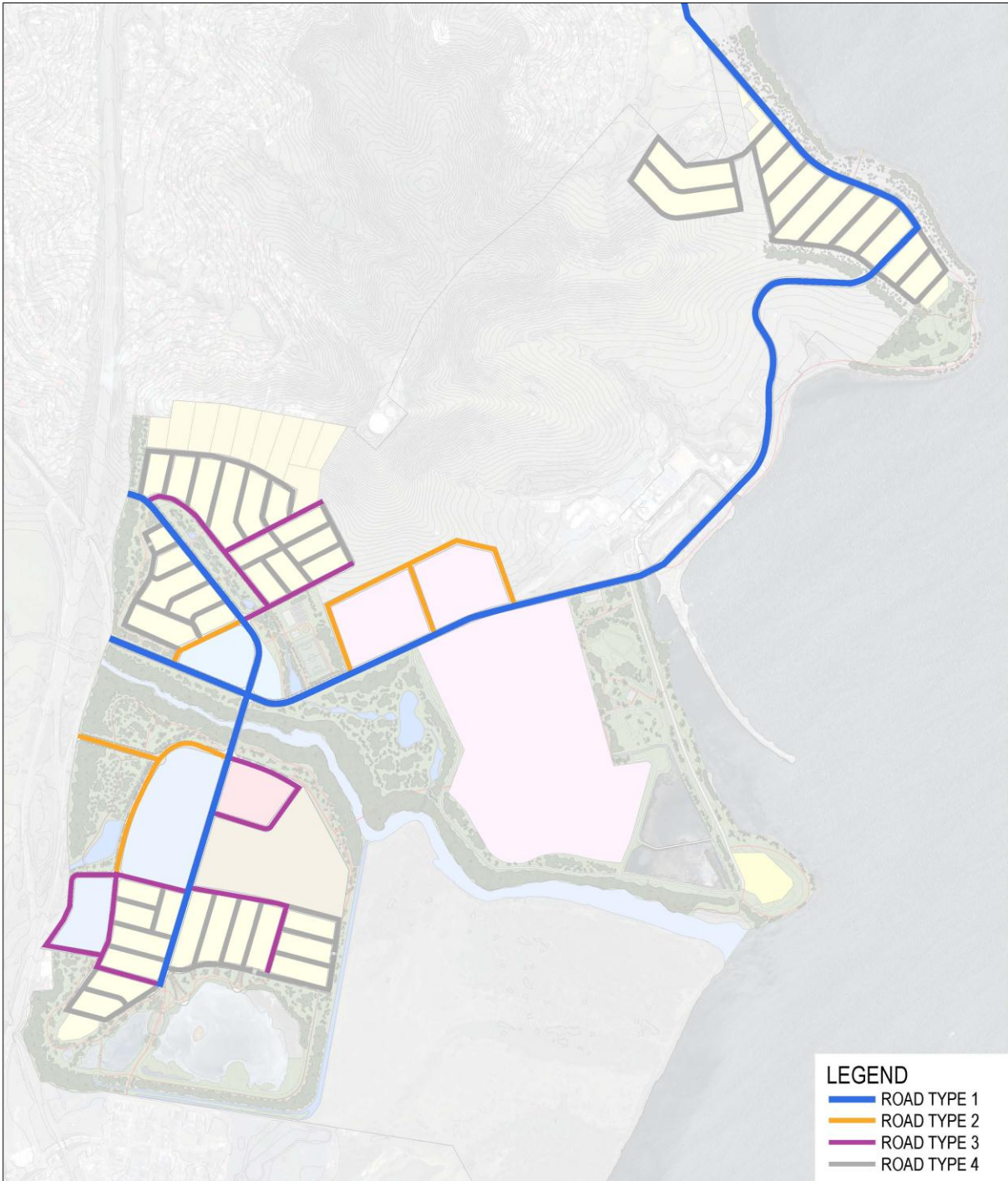
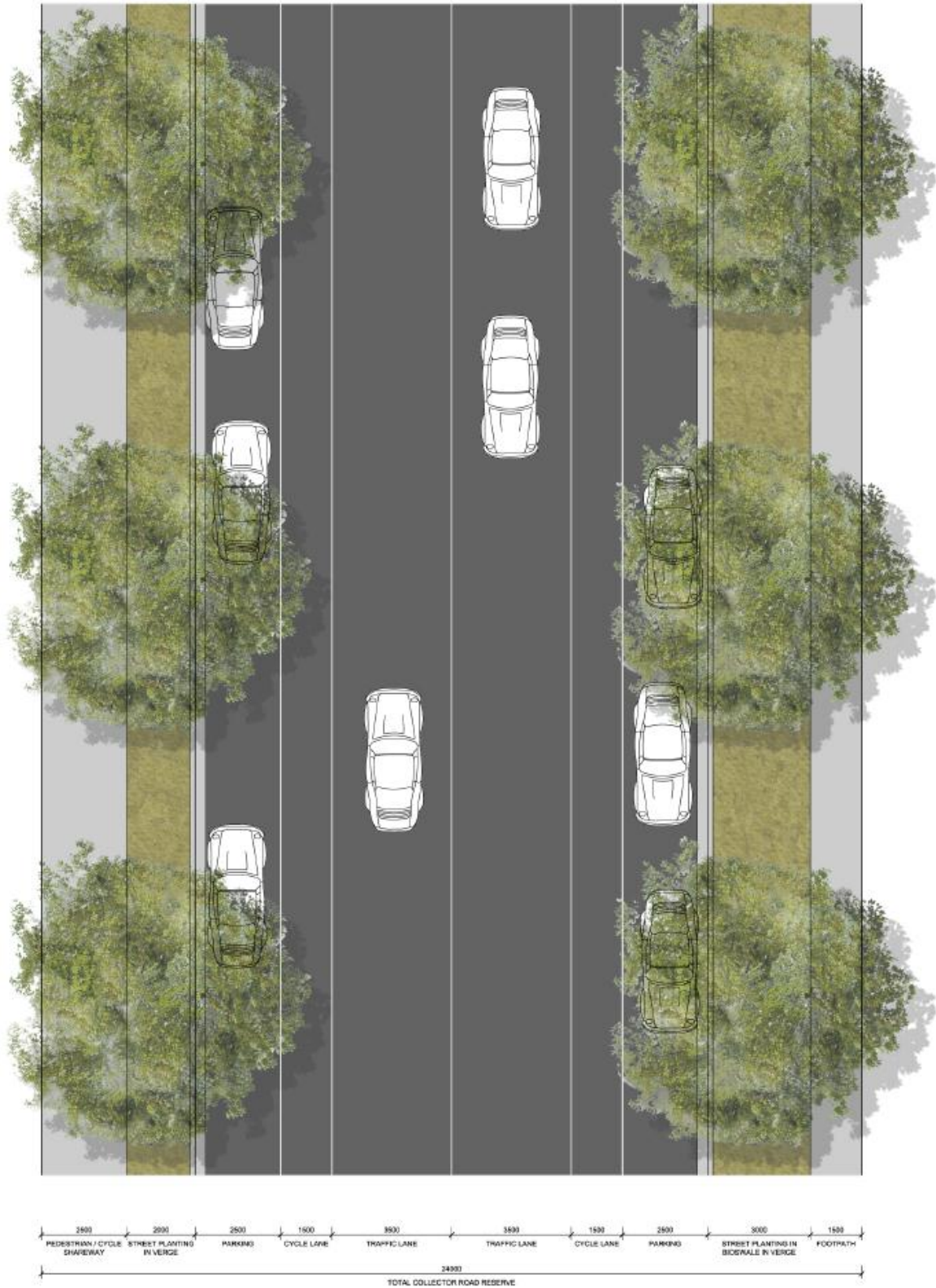


FIGURE 30 – THE STREET HIERARCHY

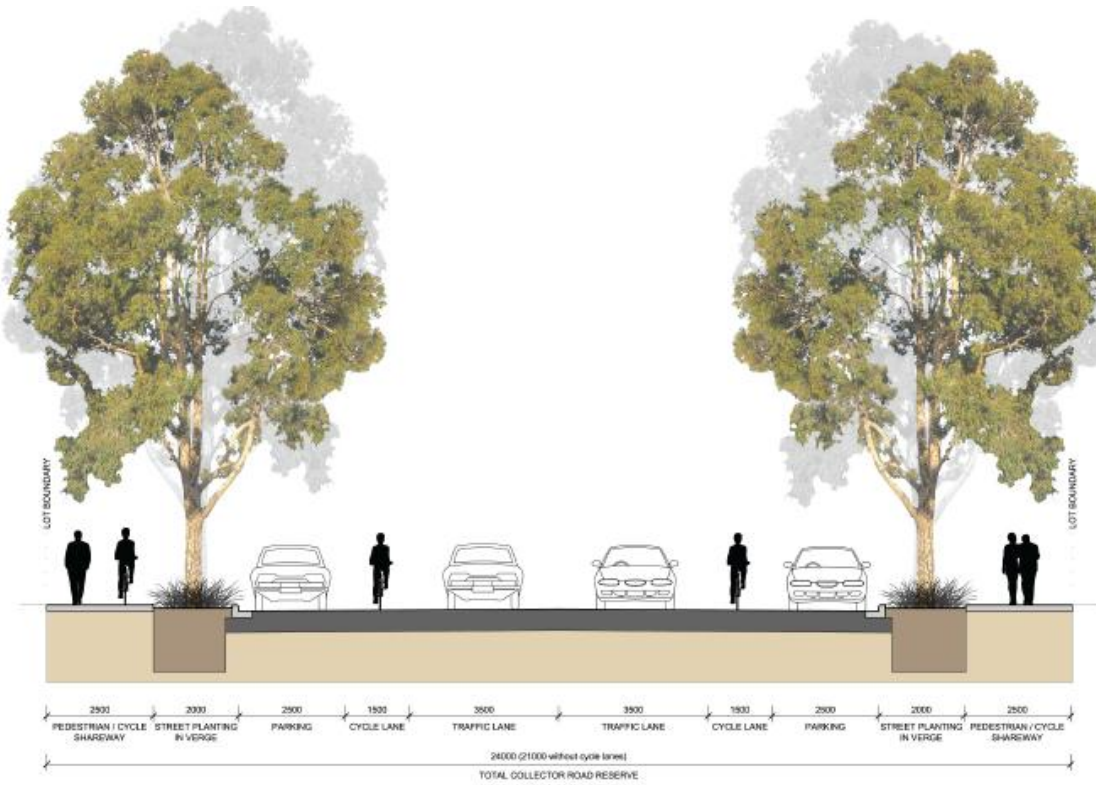


ROAD TYPE 1 – COLLECTOR ROADS

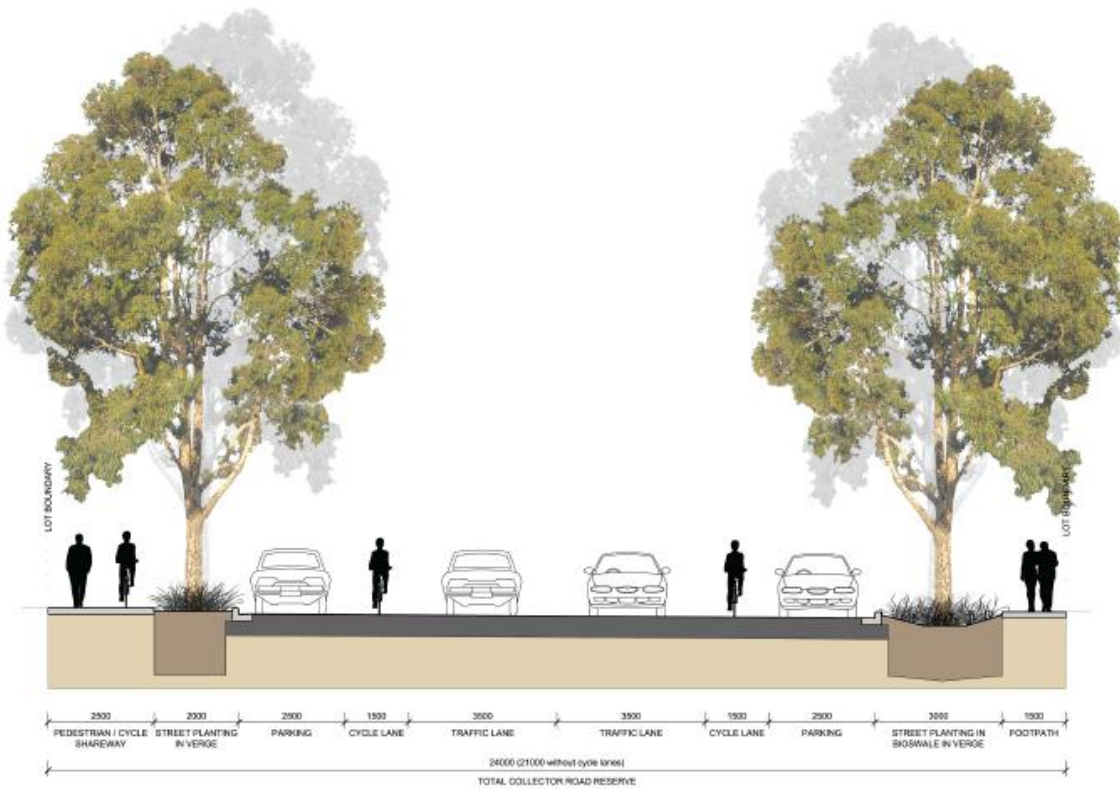


PLAN – COLLECTOR ROAD





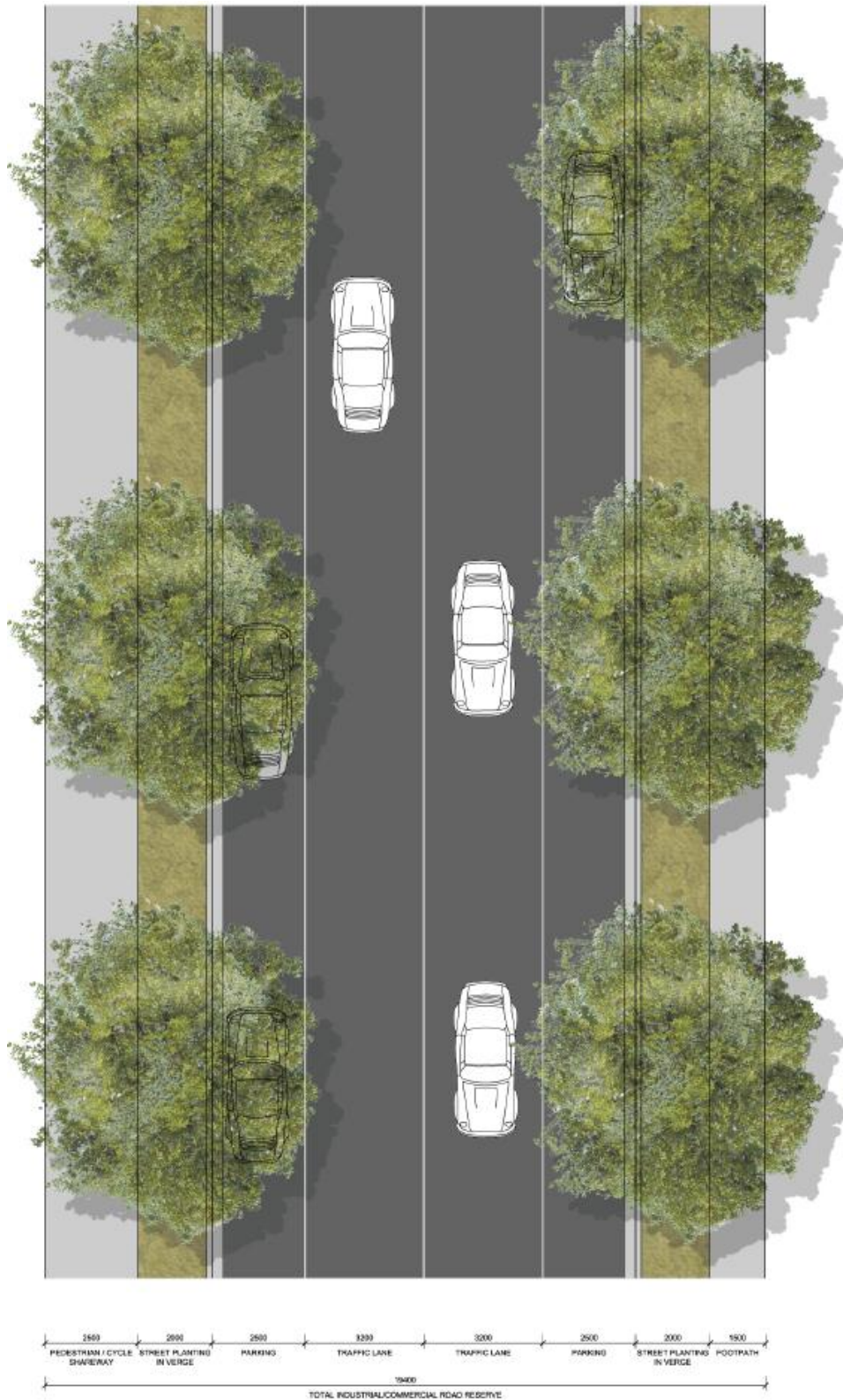
SECTION – COLLECTOR ROAD



SECTION – COLLECTOR ROAD WITH BIOSWALES



ROAD TYPE 2 – INDUSTRIAL / COMMERCIAL ROADS



PLAN – INDUSTRIAL / COMMERCIAL ROAD





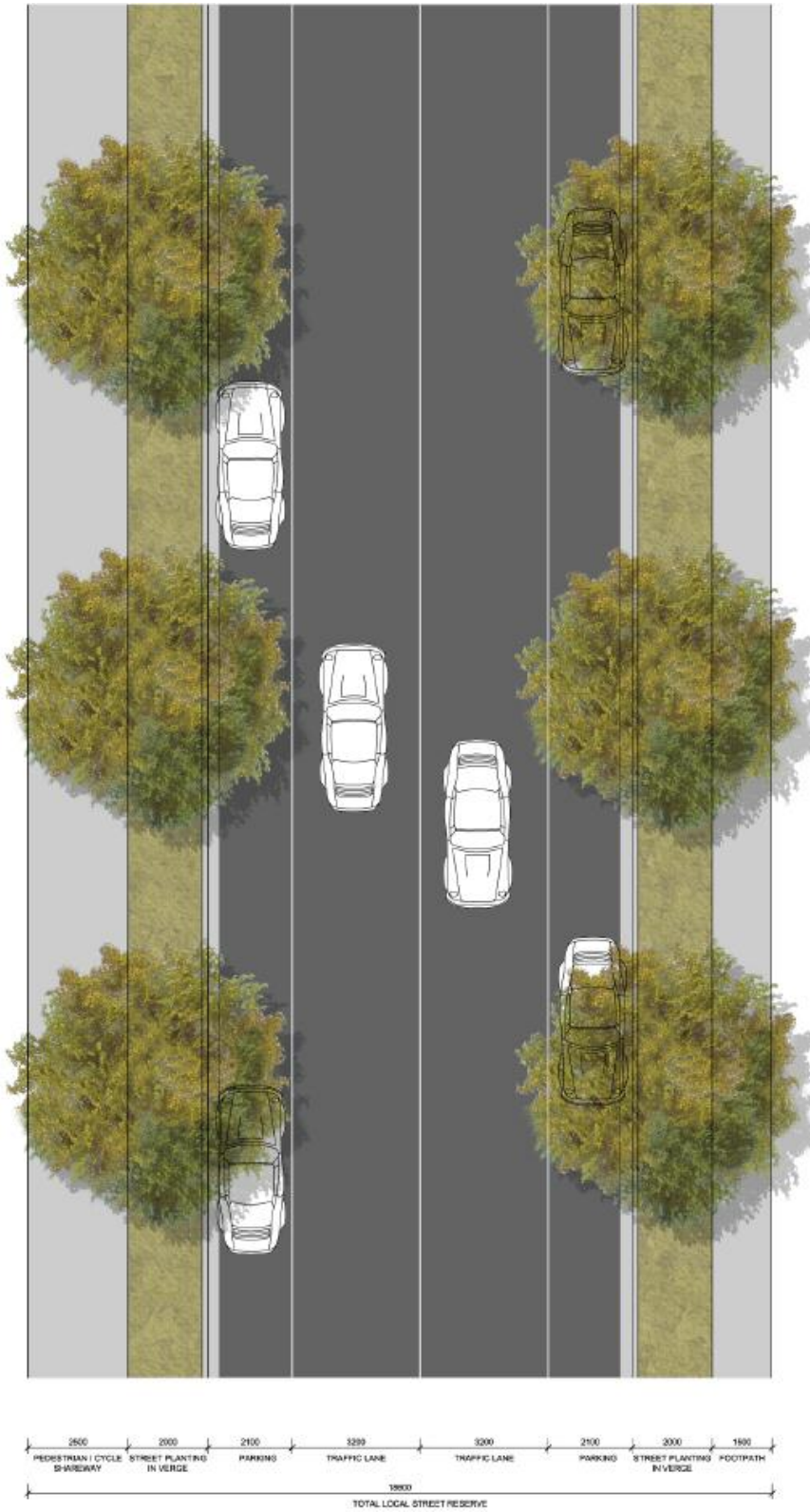
SECTION – INDUSTRIAL / COMMERCIAL ROAD



SECTION – INDUSTRIAL / COMMERCIAL ROAD WITH BIOSWALES

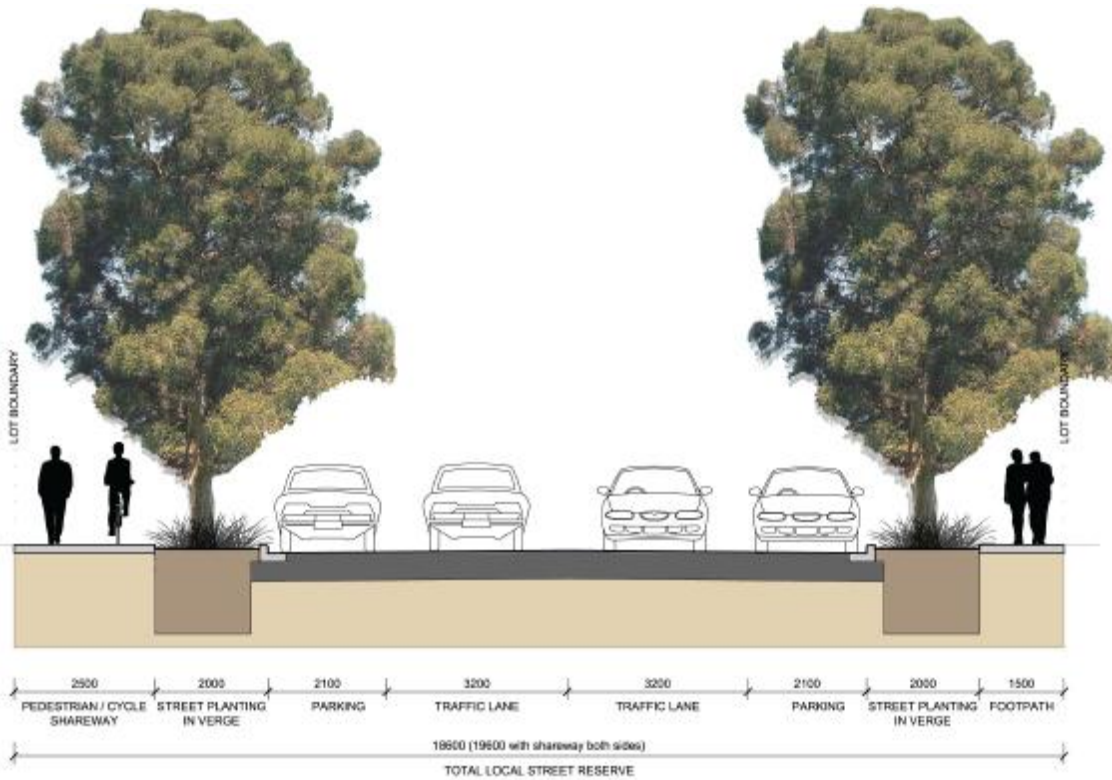


ROAD TYPE 3 – LOCAL STREETS

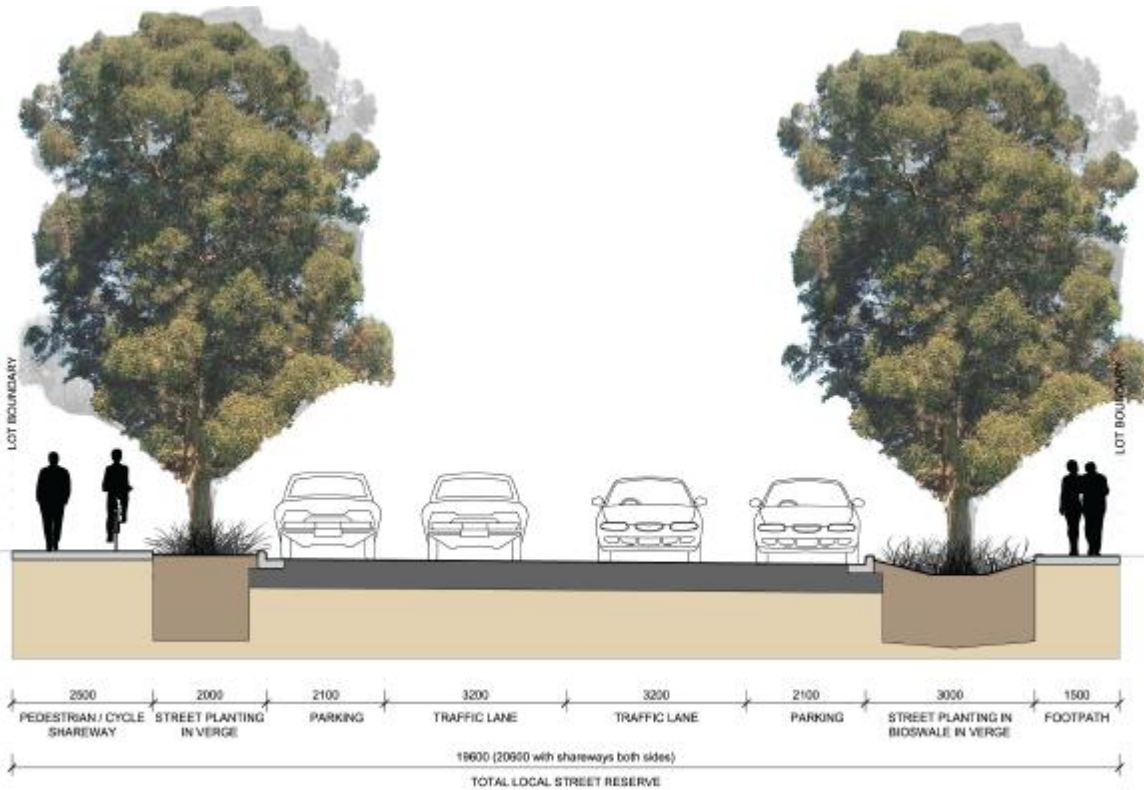


PLAN – LOCAL STREET





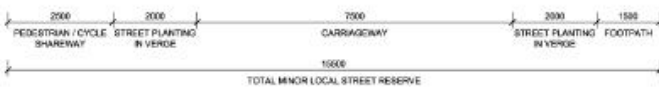
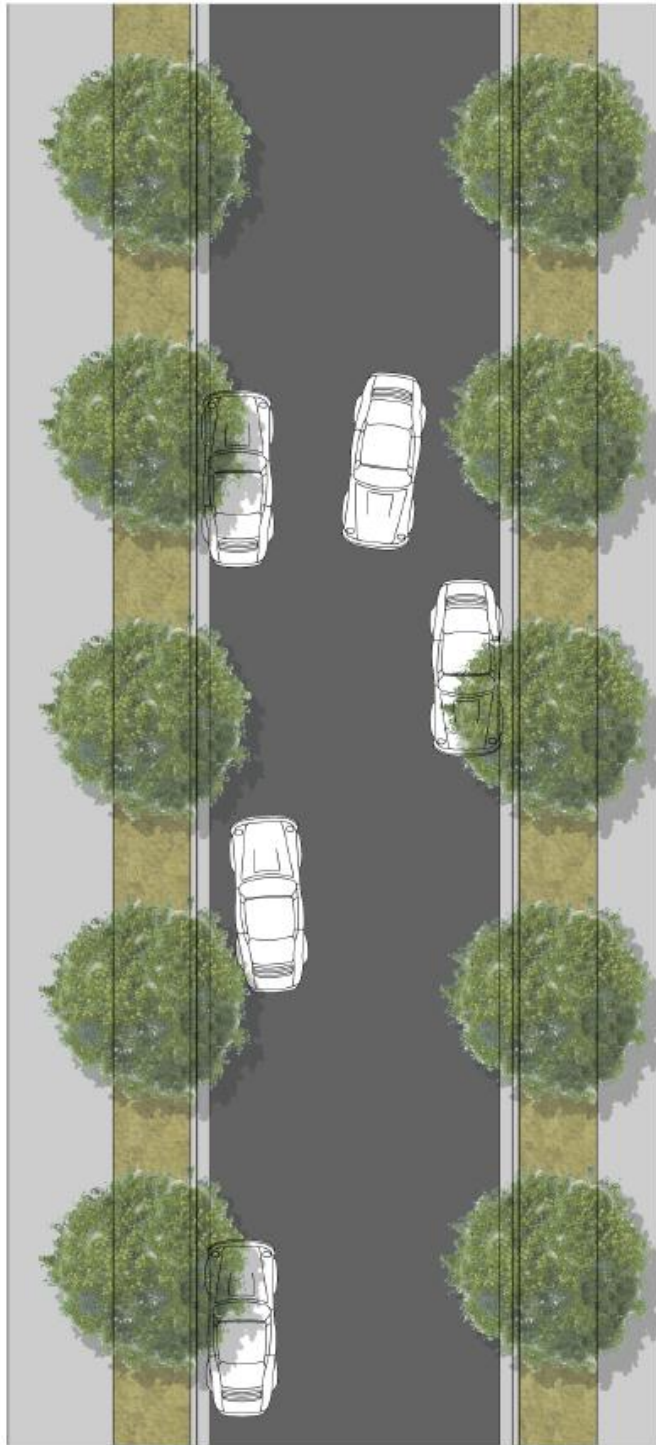
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SECTION – LOCAL STREET WITH BIOSWALES

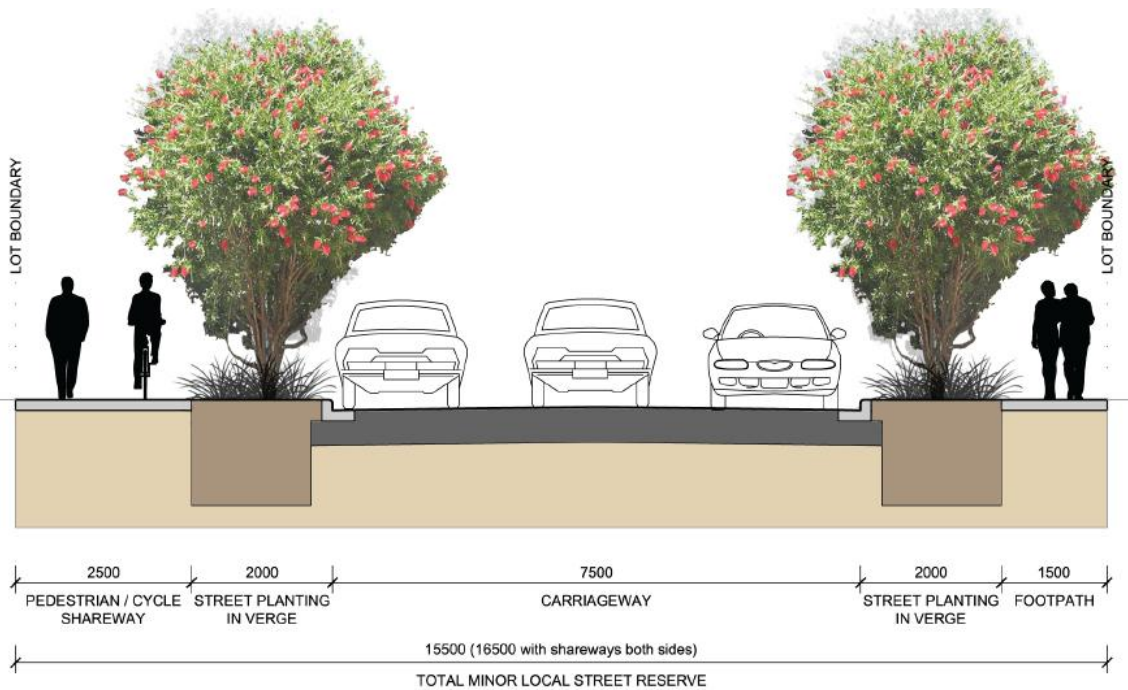


ROAD TYPE 4 – MINOR LOCAL STREETS

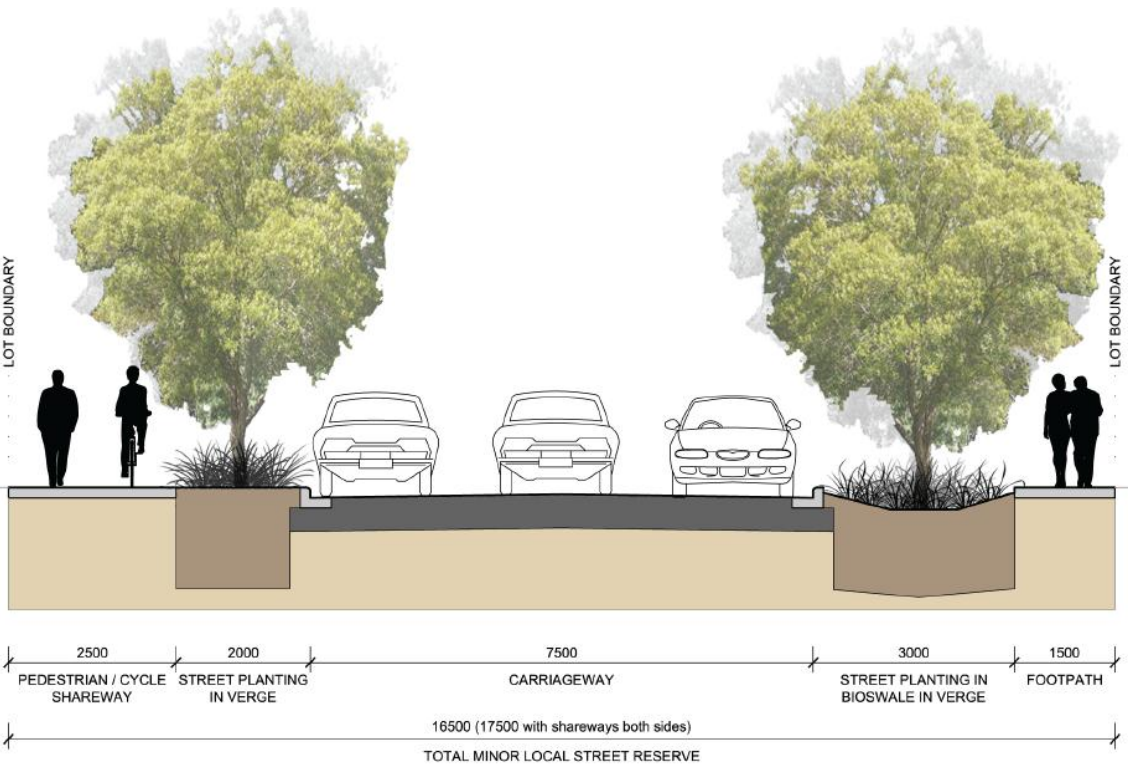


PLAN – MINOR LOCAL STREET





SECTION – MINOR LOCAL STREET



SECTION – MINOR LOCAL STREET WITH BIOSWALE



5.3 STREET TREE PLANTING STRATEGY

The selection of street trees suitable for use within the street network takes account of several key principles that are consistent with Landcom's *Street Tree Design Guidelines*. They include:

- Draw from the existing vegetation that occurs on the site to create an individual character for each Precinct.
- Design the street tree planting to unify individual streetscapes and street networks, through the layout, scale and character to create visual cohesion to the street corridor.
- Select tree species to achieve the overall design intent and take account of the site specific physical conditions.
- Optimise passive watering of plants as much as possible through the location and planting detail of street trees.
- Minimise conflicts between street trees and infrastructure, including underground and above ground services.
- Apply Water Sensitive Urban Design initiatives where appropriate, such as bio-swales and bio-retention tree pits that are integrated with street tree plantings.

An illustration of how street tree planting can significantly improve the visual and physical amenity of streets is presented in Figure 31.

Street Tree Schedules for each of the Master Plan Precincts are presented on following pages. Species suitable for use in each road type are listed in the Street Tree Schedules, which are intended to guide more detailed urban landscape design to be carried out in the next stage in the project.



NO TREES



TREES AT PLANTING



TREES AT 5 YEARS



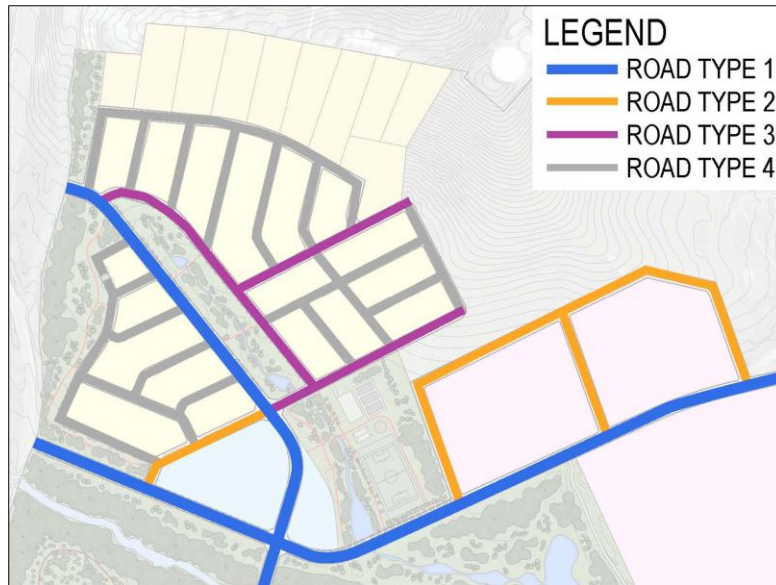
TREES AT 10 YEARS



FIGURE 31 – EXAMPLE OF TREE GROWTH OVER 10 YEARS
(Source: Landcom Corporate Website, 2010)



CENTRAL PRECINCT

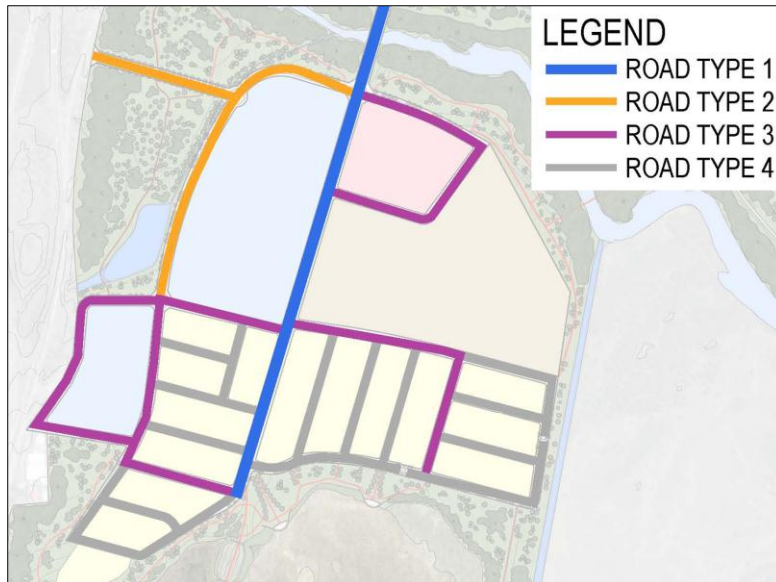


STREET TREE SCHEDULE

BOTANICAL NAME	COMMON NAME	MATURE HEIGHT x WIDTH	ROAD TYPE 1	ROAD TYPE 2	ROAD TYPE 3	ROAD TYPE 4
LARGE TREES						
<i>Alphitonia excelsa</i>	Red Ash	18 x 5m				
<i>Brachychiton acerifolium</i>	Illawarra Flame Tree	20 x 8m				
<i>Brachychiton populneus</i>	Kurrajong	15 x 8m				
<i>Corymbia maculata</i>	Spotted Gum	25 x 9m				
<i>Diploglottis australis</i>	Native Tamarind	18 x 6m				
<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark	25 x 9m				
<i>Eucalyptus longifolia</i>	Woollybutt	20 x 9m				
<i>Eucalyptus punctata</i>	Grey Gum	20 x 9m				
<i>Eucalyptus tereticornis</i>	Forest Red Gum	20 x 9m				
<i>Livistona australis</i>	Cabbage Tree Palm	20 x 9m				
<i>Lophostemon confertus</i>	Brushbox	12 x 7m				
SMALL – MEDIUM TREES to 10m						
<i>Acmena smithii</i>	Lilly Pilly	10 x 5m				
<i>Backhousia myrtifolia</i>	Grey Myrtle	3 x 2.5m				
<i>Callistemon salignus</i>	Willow Bottlebrush	6 x 4m				
<i>Callistemon viminalis</i> 'Hannah Ray'	Weeping Bottlebrush	5 x 4m				
<i>Cupaniopsis anacardioides</i>	Tuckeroo	8 x 5m				
<i>Elaeocarpus reticulatus</i>	Blueberry Ash	8 x 4m				
<i>Glochidion ferdinandi</i>	Cheese Tree	8 x 6m				
<i>Melaleuca decora</i>	Feather Honey-Myrtle	6 x 4m				
<i>Melaleuca ericifolia</i>	Swamp Paperbark	4 x 3m				
<i>Melaleuca styphelioides</i>	Prickly-leafed Tea Tree	8 x 4m				
<i>Pittosporum rhombifolium</i>	White Holly	8 x 5m				
<i>Podocarpus elatus</i>	Brown pine	9 x 5m				
<i>Stenocarpus sinuatus</i>	Firewheel Tree	8 x 3m				
<i>Syzygium luemannii</i>		8 x 4m				
<i>Tristaniopsis laurina</i>	Water Gum	10 x 6m				



SOUTHERN PRECINCT

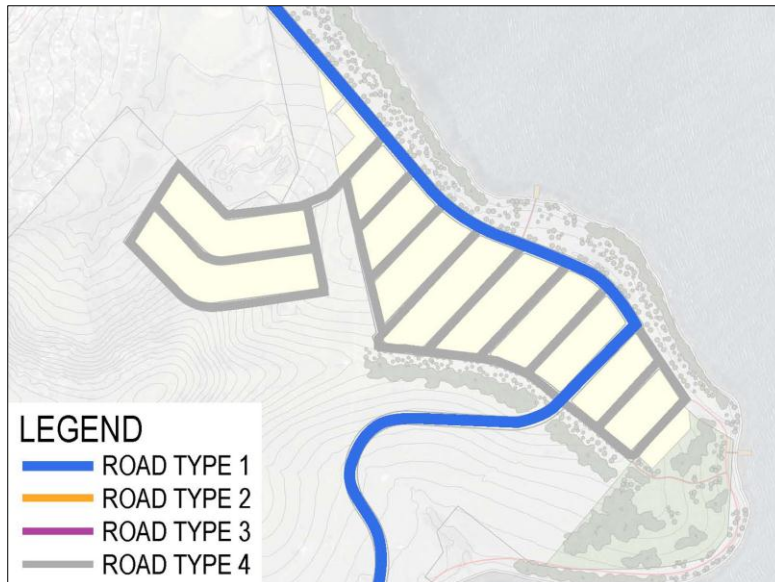


STREET TREE SCHEDULE

BOTANICAL NAME	COMMON NAME	MATURE HEIGHT x WIDTH	ROAD TYPE 1	ROAD TYPE 2	ROAD TYPE 3	ROAD TYPE 4
LARGE TREES						
<i>Alphitonia excelsa</i>	Red Ash	18 x 5m				
<i>Corymbia maculata</i>	Spotted Gum	25 x 9m				
<i>Eucalyptus bosistoana</i>	Coastal Grey Box	25 x 9m				
<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark	25 x 9m				
<i>Eucalyptus longifolia</i>	Woollybutt	20 x 9m				
<i>Eucalyptus robusta</i>	Swamp Mahogany	15 x 7m				
<i>Eucalyptus tereticornis</i>	Forest Red Gum	20 x 9m				
SMALL – MEDIUM TREES to 10m						
<i>Callistemon salignus</i>	Willow Bottlebrush	6 x 4m				
<i>Lophostemon suaveolens</i>	Swamp Turpentine	8 x 3m				
<i>Melaleuca decora</i>	Feather Honey-Myrtle	6 x 4m				
<i>Melaleuca ericifolia</i>	Swamp Paperbark	4 x 3m				
<i>Melaleuca linariifolia</i>	Snow in Summer	8 x 4m				
<i>Melaleuca styphelioides</i>	Prickly-leafed Tea Tree	8 x 4m				



NORTHERN PRECINCT



STREET TREE SCHEDULE

BOTANICAL NAME	COMMON NAME	MATURE HEIGHT x WIDTH	ROAD TYPE 1	ROAD TYPE 4
LARGE TREES				
<i>Acacia maidenii</i>	Maiden's Wattle	12 x 7m		
<i>Alphitonia excelsa</i>	Red Ash	18 x 5m		
<i>Brachychiton acerifolium</i>	Illawarra Flame Tree	20 x 8m		
<i>Brachychiton populneus</i>	Kurrajong	15 x 8m		
<i>Eucalyptus amplifolia</i>	Cabbage Gum	18 x 9m		
SMALL – MEDIUM TREES				
<i>Acmena smithii</i>	Lilly Pilly	10 x 5m		
<i>Backhousia citriodora</i>	Lemon-scented Myrtle	6 x 3m		
<i>Callistemon salignus</i>	Willow Bottlebrush	6 x 4m		
<i>Callistemon viminalis 'Hannah Ray'</i>	Weeping Bottlebrush	5 x 4m		
<i>Cupaniopsis anacardioides</i>	Tuckeroo	8 x 5m		
<i>Elaeocarpus reticulatus</i>	Blueberry Ash	8 x 4m		
<i>Glochidion ferdinandi</i>	Cheese Tree	8 x 6m		
<i>Melaleuca styphelioides</i>	Prickly-leafed Tea Tree	8 x 4m		
<i>Streblus brunonianus</i>	Whalebone Tree	6 x 4m		
<i>Syzygium luemannii</i>	Riberry	8 x 4m		
<i>Tristaniopsis laurina</i>	Water Gum	10 x 6m		



5.4 WSUD APPLICATION TO STREET NETWORK

Water Sensitive Urban Design (WSUD) initiatives incorporated in the Landscape Plan are aimed at minimising potable water consumption, stormwater pollution and stormwater runoff. As the roads and paths form large impervious areas within the urban development, WSUD initiatives are to be implemented in the street network to minimise the potential impact on water resources (Figure 32).

The following principles have been adopted:

- Stormwater treatment elements are to be utilised for their aesthetic contribution as well as ecological and environmental benefits.
- The scale of WSUD elements is to take account of the extent of impervious surfaces.
- WSUD elements within the streetscape are only appropriate where slopes are less than 2% grade. In the Central and Northern Precincts, where slopes exceed a grade of 2%, it is proposed to use end-of-line biofiltration basins located within open space areas.



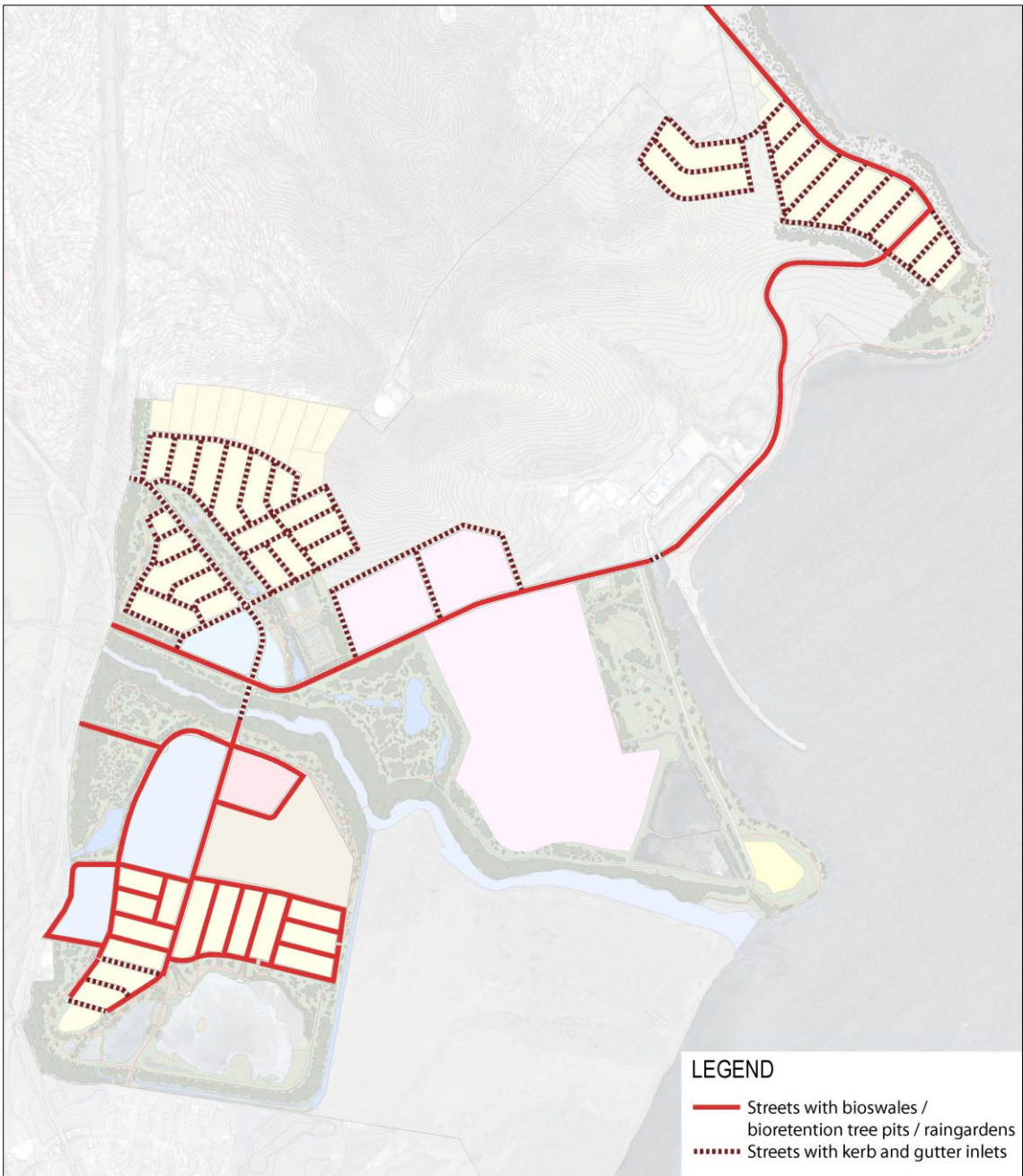


FIGURE 32 – WATER SENSITIVE URBAN DESIGN RELATED TO STREET NETWORK



DESIGN FOR PASSIVE WATERING

Passive watering of street trees and other planting is to be achieved through the installation of bio-swales and rain gardens (Figure 33). These elements allow stormwater runoff to be redirected to the planting bed for treatment prior and to assist plant growth. The treated water can then enter be discharged into the natural drainage system. (Landcom, 2006)

Benefits of this approach include reduced stormwater volumes and slower flow rates; a greater capacity to deal with high flow events and the treatment of stormwater runoff; reduced pollution of natural watercourses. In addition the volume of natural rainfall available to assist the growth of street trees and other plants is significantly increased.

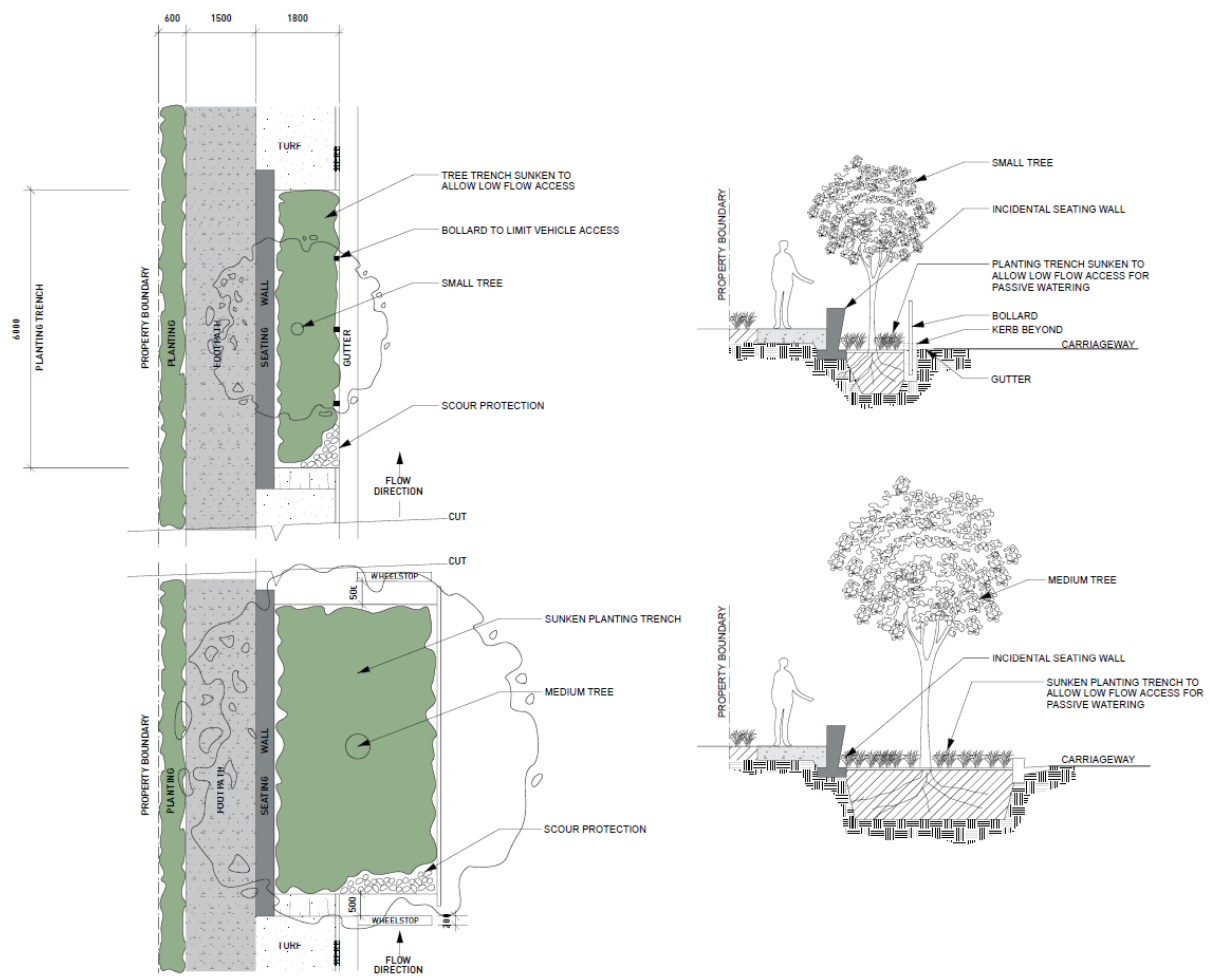
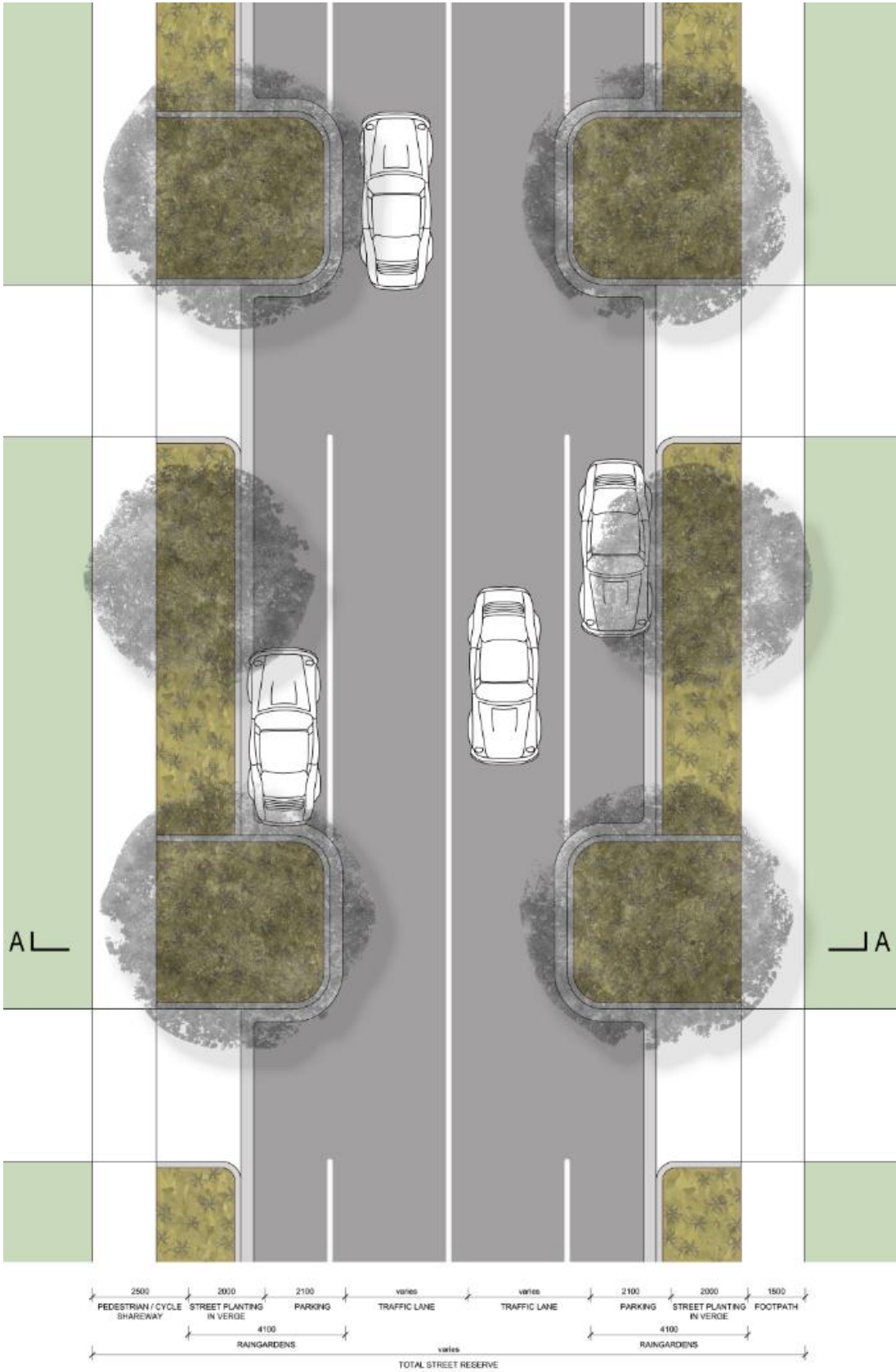


FIGURE 33 – TYPICAL BIO-SWALES AND RAIN GARDENS WITHIN THE STREETSCAPE

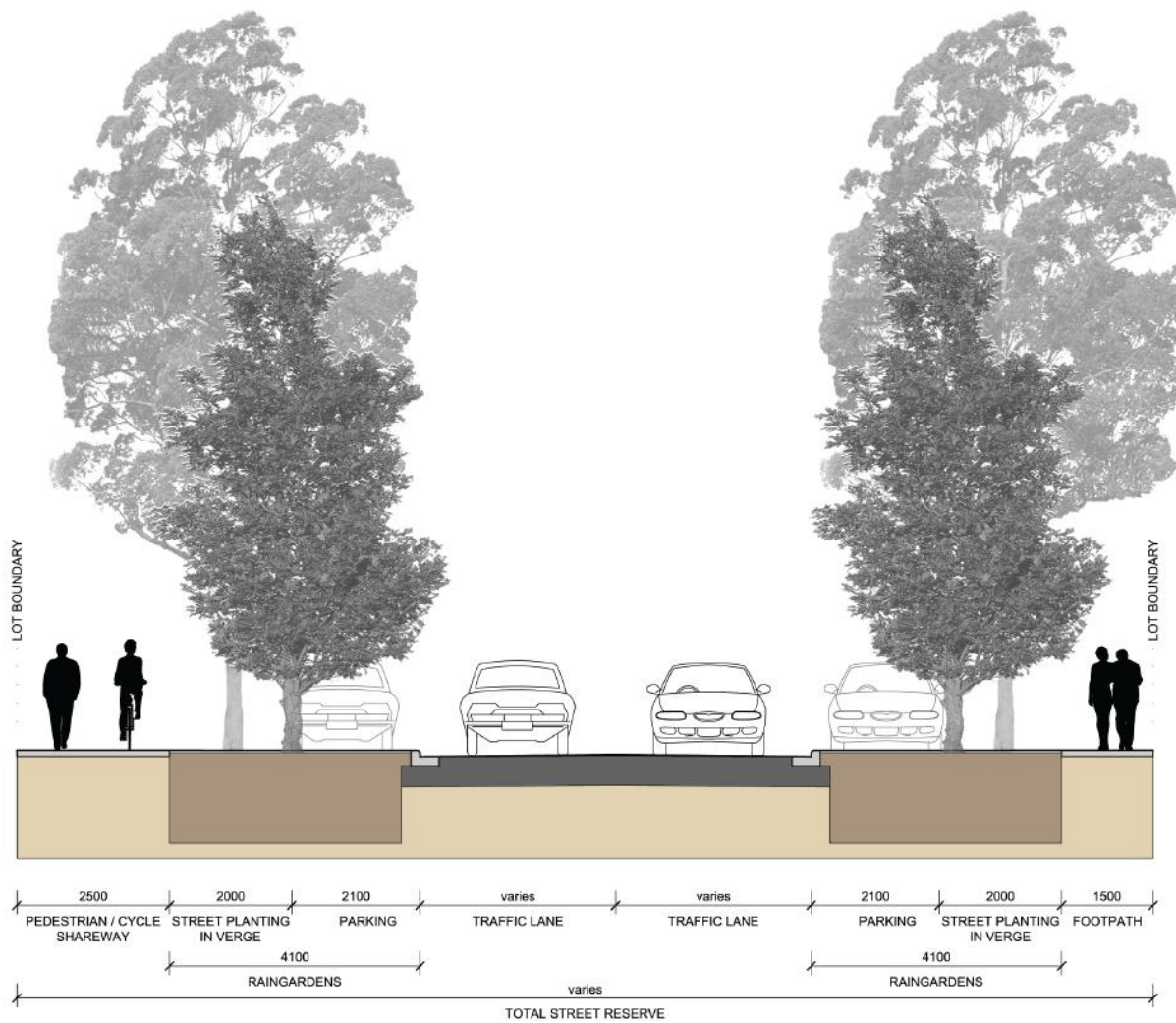
(Source: Landcom, 2006)





PLAN: RAINGARDENS WITHIN THE ROAD RESERVE





SECTION AA: RAINGARDENS WITHIN THE ROAD RESERVE



Bio-retention tree pits are designed to direct stormwater runoff from adjacent impervious surfaces into the tree pit to provide additional water to the tree and improve the quality of water that enters the drainage system after passing through soil in the tree pit. Stormwater enters the pit through gaps in the road kerb and is filtered through the soil of the tree pit. Water that is not taken up by the tree roots is carried by sub-soil drainage to the conventional stormwater drainage system.

The use of street trees in this way provides shade and visual amenity in the street environment while treating stormwater prior to entering natural waterways. This form of passive irrigation has the additional benefit of reduced the use of irrigation water from other sources such as mains supplies. (Landcom, 2006)

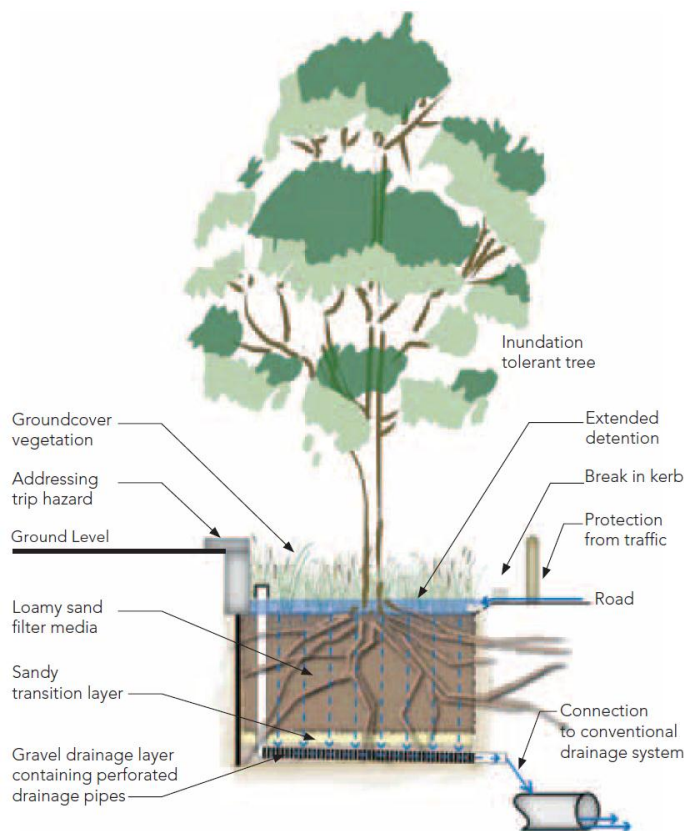


FIGURE 34 – TYPICAL BIO-RENTION TREE PIT

(Source: Landcom, 2006)

5.5 CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

The principles for Crime Prevention Through Environmental Design (CPTED) that have been applied to streetscapes are similar to those presented in Section 3.4 in relation to open space, although the implementation methods are varied to some extent. The CPTED principles that are particularly relevant to streetscape design include:

- Planting design should not create 'blind spots' where the ability to see or be seen is reduced, in particular avoiding dense tall shrubs adjoining footpaths and shareways.
- Street tree planting should take account of lighting to ensure appropriate surveillance and avoid large shadow areas.
- Design of street tree planting should be coordinated with signage to avoid potential visual conflicts.



6.0 Landscape Principles within Urban Development

6.1 INTRODUCTION

This section describes the design principles to be applied to landscape planning and design within the urban environment. They cover both public and private spaces, and include the following categories:

- Residential Landscape Principles
- Employment Lands Landscape Principles
- Neighbourhood Centre Landscape Principles

The Principles presented are intended to guide the more detailed design of open spaces that is to follow at a later stage in the design process.



6.2 RESIDENTIAL LANDSCAPE PRINCIPLES

The importance of landscape within the residential environment extends beyond the vegetation of the streetscape to include landscape elements within private residential lots that are visible from street and contributes to its visual quality.

The following Residential Landscape Principles are intended to guide the design of landscape works to be carried out within private residential properties.

Visual Amenity –

- Trees planted in backyards should, where possible, be large enough to be seen from the street and offer a backdrop to the buildings.
- Medium size trees and shrubs should be utilised in the front of residential properties to enhance the visual quality of the streetscape.



FIGURE 35 – PLANTING USED TO ENHANCE VISUAL QUALITY OF URBAN FORM
(Source: Landcom Corporate Website, 2010)

Ecologically Sustainable Design –

- Ensure access to daylight to relevant portions of buildings and outdoor use areas is not compromised by locating trees incorrectly.
- Utilise landscape elements and planting works for wind mitigation as well as natural ventilation.
- Provide shade to buildings in summer to minimise the consumption of energy for cooling
- Allow solar access to buildings in winter to minimise energy consumption for heating

Biodiversity –

- Where possible select plant species that contribute positively to biodiversity.
- Avoid the use of species that are classified as environmental weeds.



Incorrect placement of trees within backyards can hinder neighbouring properties' access to daylight.



Correct placement of trees does not hinder access to daylight.

FIGURE 36 – PLANTING TO ENSURE ACCESS TO DAYLIGHT

(Source: Landcom Corporate Website, 2010)





FIGURE 37 – VERGE PLANTING (TOP) AND RAIN GARDEN/TREE PIT PLANTING (BOTTOM)
(Source: Landcom Corporate Website, 2010)

6.3 EMPLOYMENT LANDS LANDSCAPE PRINCIPLES

Landscape treatment throughout the employment lands will play a major role in mitigating the potential visual impact of large scale industrial and office buildings. While the landscape principles defined below are focused on the streetscape, similar principles should be extended to individual lots to achieve an integrated urban landscape outcome throughout the employment lands.

Visual Amenity

- Where possible, plant large trees that are in scale with buildings to mitigate the visual impact of roof lines when seen from external viewpoints, including proposed residential development on higher elevation areas in the Central Precinct and Mount Brown.
- Utilise medium trees and shrubs planting within property frontages to reduce the visual scale of buildings and create an attractive and streetscape.

Function

- Ensure the use of landscape elements and plantings is practical and does not conflict with commercial or industrial land uses, such as the operation of large machinery / vehicles.

Ecologically Sustainable Design

- Where appropriate, incorporate bio-retention and water reticulation elements into commercial and industrial development.
- Utilise landscape elements and planting works for wind mitigation and natural ventilation.

Biodiversity

- Select plant species that do not classified as environmental weeds.
- Where possible, select plant species that contribute positively to the biodiversity of the area.



6.4 NEIGHBOURHOOD CENTRE LANDSCAPE PRINCIPLES

Landscape design throughout the Neighbourhood Centre will play a key role in creating an attractive, functional and safe urban environment. The Landscape Principles presented below will guide future detailed design within the Neighbourhood Centre.

Visual Amenity

- Utilise planting and landscape treatments to strengthen the local landscape character and create a distinctive Neighbourhood Centre.
- Use plantings and/or landscape design elements to frame entrances or identify destinations.
- Utilise medium trees and shrubs planting throughout the Neighbourhood Centre to soften the visual impact on public spaces and adjoining streetscapes.

Function

- Provide formal landscape spaces that support a variety of activities in close proximity to buildings, courtyards and entrances.
- Provide summer shade and winter sun to plazas and pathways.
- Ensure WSUD and CPTED principles are incorporated into the design of landscape treatments within the Neighbourhood Centre.

Ecologically Sustainable Design

- Develop a Neighbourhood Centre landscape that minimises water requirements, protects the adjacent natural environment, enhances biodiversity, utilises native flora and minimises consumption of energy and non-renewable resources.
- Where possible, incorporate bio-retention and water reticulation elements into the public domain of the Neighbourhood Centre.
- Utilise landscape planting to provide shade, mitigate wind and assist natural ventilation of public spaces with the Neighbourhood Centre.

Biodiversity

- Select plant species that contribute positively to biodiversity in the area.
- Avoid planting environmental weed species).



7.0 Conclusion

The Landscape Plan provides a framework for the development of the Open Space Network, Streetscapes and Urban Environments throughout the Tallawarra Lands. It presents a vision and explains the planning and design principles adopted. The Landscape Plan also describes how these principles can be applied to the future detailed design across the full range of private and public landscapes throughout the urban environment.

More detailed urban and landscape design will be required within the framework of this Landscape Plan as the Tallawarra Lands project moves forward.



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APPENDIX 1 –
TALLAWARRA LANDS LANDSCAPE ASSESSMENT









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