

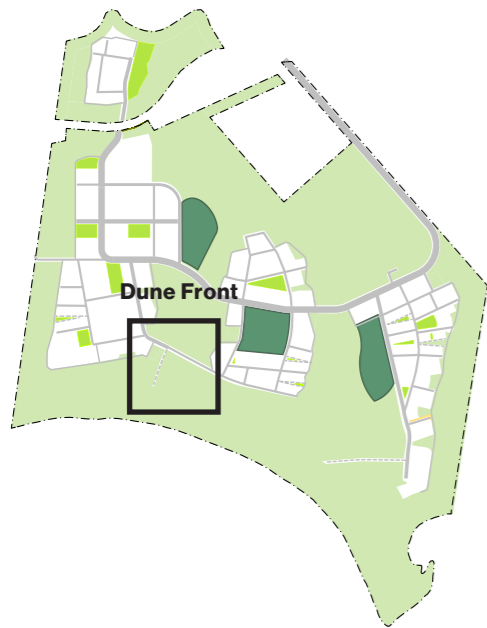


The Waterfront

The Waterfront area connects the Town Centre to the dune and beachside.

The dune front area features an active plaza, Surf Life Saving Club and public car park providing access to the beach and important social infrastructure.

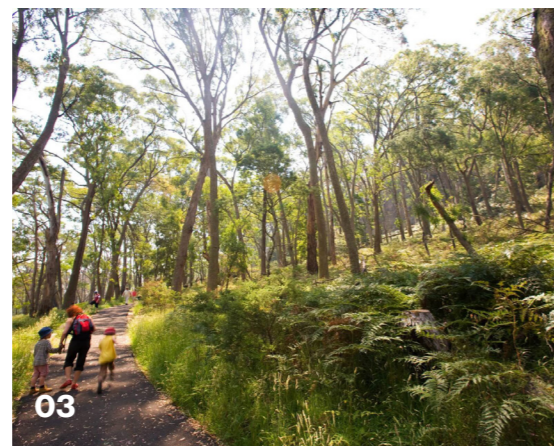
- ① Waterfront plaza
- ② Viewing Deck
- ③ Walkways behind dune
- ④ Surf Life Saving Club
- ⑤ Underground public car park located below the Surf Life Saving club, covered by Coastal Dune
- ⑥ Littoral Rainforest
- ⑦ Ecological corridor



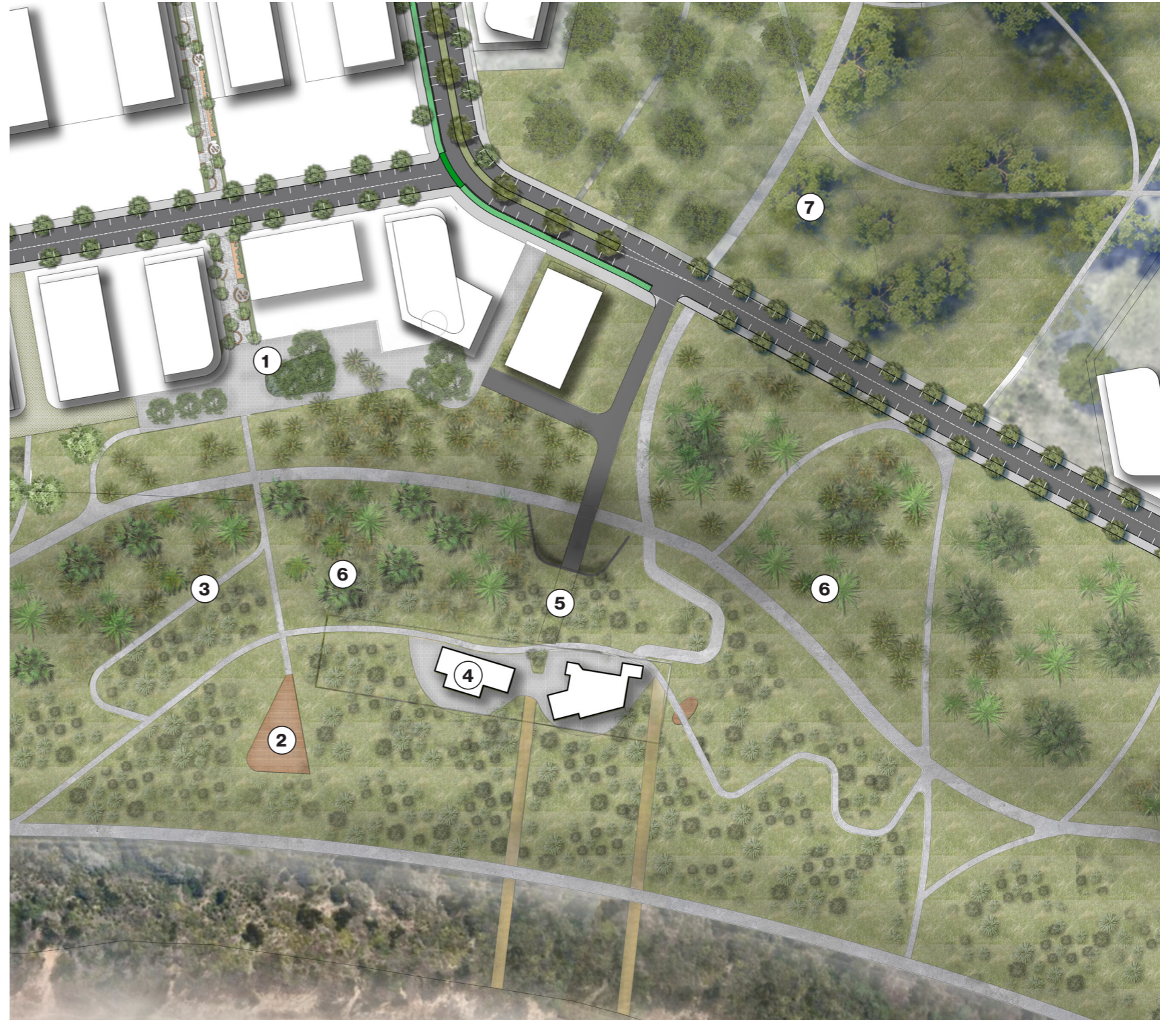
Waterfront plaza
The Canopy Precinct | Arcadia Landscape Architecture



Viewing deck
Aqua Vida , Nags Head



Walkways behind dune
Hepburn Springs



Bridge Crossings

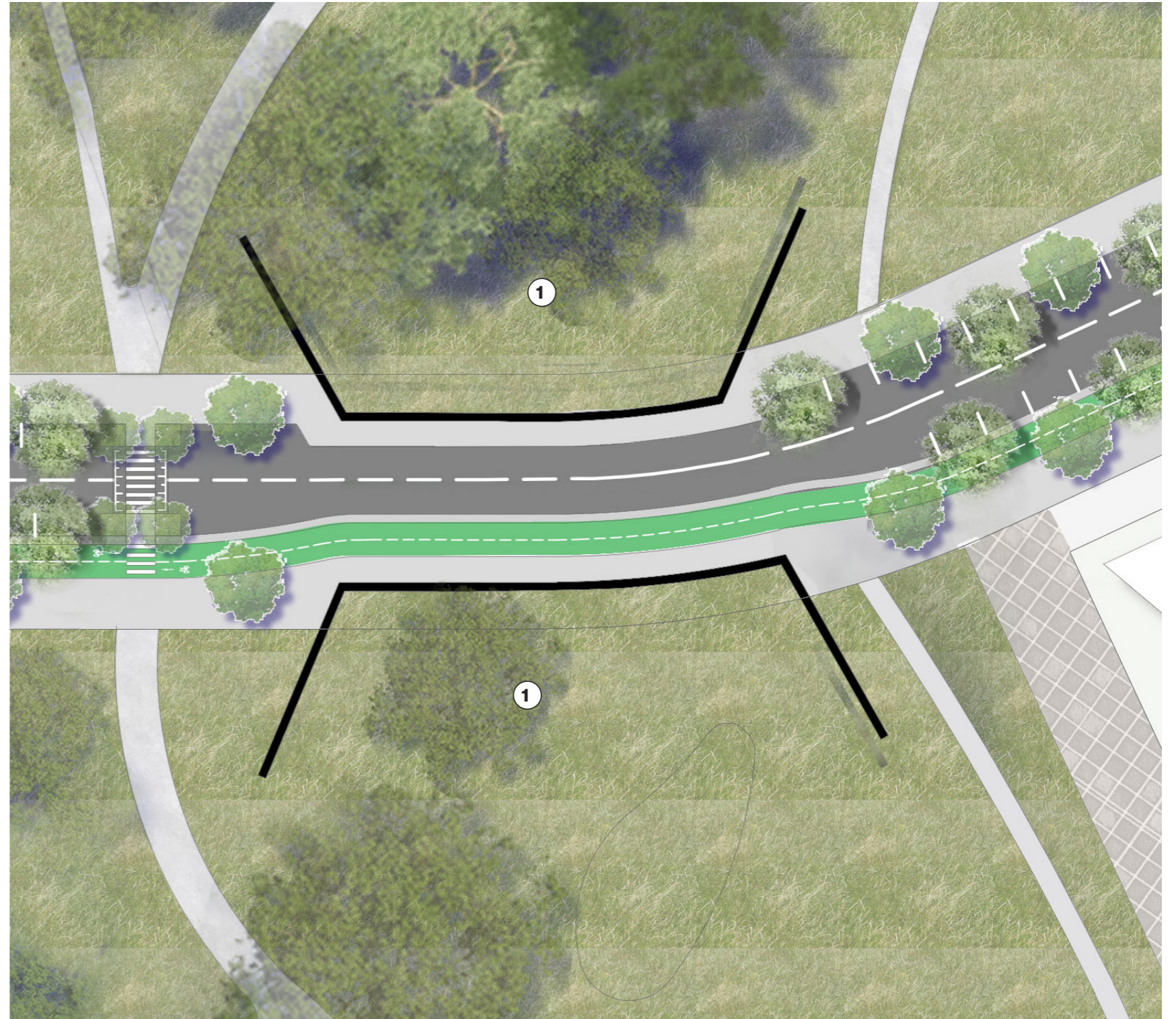
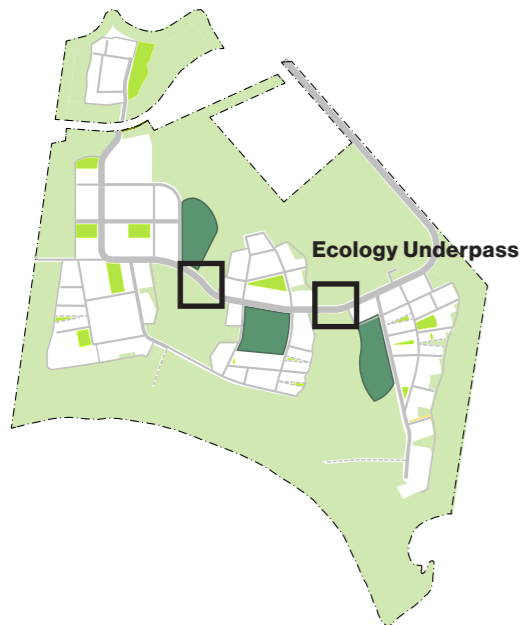
The road crossings of the ecological corridors are design with considering of fauna movement and vegetation connection.

The roads crossing the ecological corridors are designed to be ecological sensitive to encourage fauna movement underneath and continuation of waterways and vegetation communities.

This will be achieved through the minimising road width in these areas and designing as bridge crossings. The bridges will allow vegetation and water flow to continue underneath.



Wildlife underpass
Calder Freeway | VicRoads



PLANTING PALETTE | ECOLOGICAL CORRIDOR

LITTORAL RAINFOREST



Trees

Understorey



Livistona australis | Cabbage Tree Palm



Adenostoma sparsifolium | Ribbonwood



Hibbertia scandens | Snake Vine



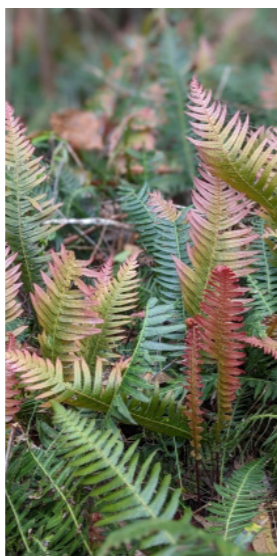
Pandorea pandorana | Wonga Wonga vine



Asplenium australasicum | Bird's Nest Fern



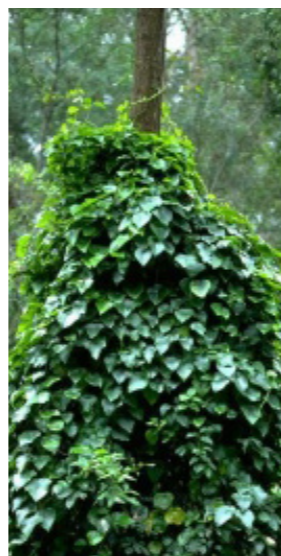
Acmena smithii | Lily Pilly



Doodia aspera | Prickly Rasp Fern



Morinda jasminoides | Jasmine Morinda



Stephania japonica | Stephania japonica

FIG AND NATIVE WOODLANDS

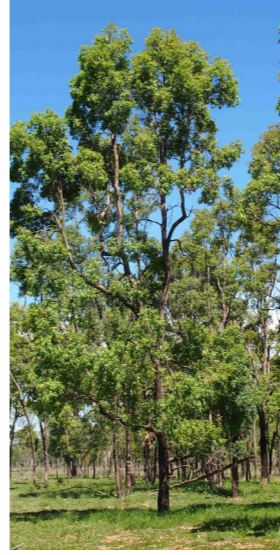


Trees

Understorey



Acacia implexa | Hickory wattle



Angophora floribunda | Rough Barked Apple



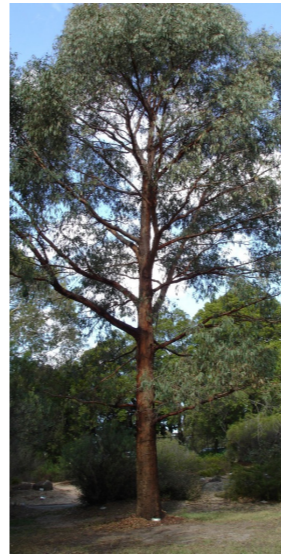
Bursaria spinosa | Sweet Bursaria



Acacia mearnsii | Green Wattle



Leucopogon juniperinus | Prickly Beard-Heath



Eucalyptus radiata | Narrow-leaved Peppermint



Ficus rubiginosa | Ribbonwood



Eustrephus Latifolius | Wombat Berry



Glycine clandestina | Twining Glycine

TALL TURPENTINE/EUCALYPTUS WOODLAND



Trees

Understorey



Eucalyptus botryoides |
Bangalay



Syncarpia glomulifera |
Turpentine Tree



Acacia longifolia | Golden Wattle



Melaleuca nodosa | Prickly-
Leaved Paperbark



Eucalyptus umbra | Broad White
Leaved Mahogany



Corymbia intermedia | Pink
Bloodwood



Xanthorrhoea fulva | The Wallum
Grass tree



Eremochloa bimaculata |
Poverty Grass

SWAMP SCLEROPHYLL FOREST



Trees

Understorey



Eucalyptus robusta |
Swamp Mahogany



Eucalyptus botryoides |
Bangalay



Acacia irrorata | Green
Wattle



Dodonaea triquetra | Hop
Bush



Ficus coronata |
Sandpaper Fig



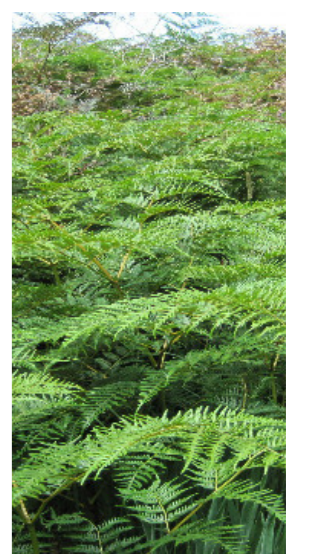
Melaleuca quinquenervia |
Broad Leaved Paperbark



Lomandra longifolia |
Spiny Headed Mat Rush



Entolasia marginata |
Panic Grass



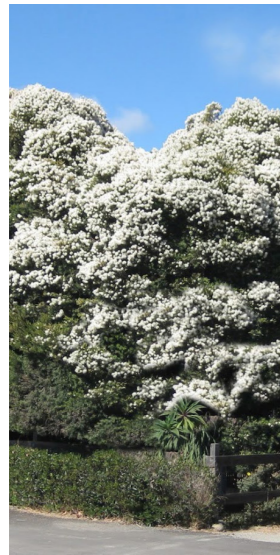
Pteridium esculentum |
Bracken Fern

PAPERPARK WOODLANDS

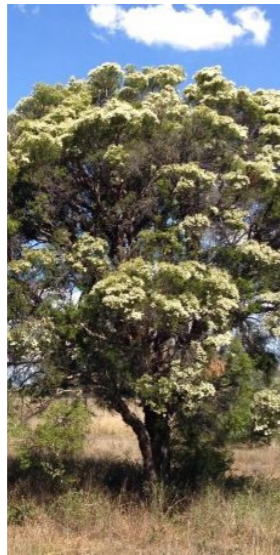


Trees

Understorey



Melaleuca linariifolia | Snow in Summer



Melaleuca decora | White Feather Honeymyrtle



Melaleuca nodosa | Prickly Leaved Paperbark



Bursaria sipnosa | Blackthorn



Leucopogon juniperinus | Prickly Beard-Heath



Melaleuca quinquenervia | Broad Leaved Paperbark



Carex appressa | Tall Sledge



Lomandra longifolia | Spiny Headed Mat Rush

COASTAL SWAMP OAK



Trees

Understorey



Casuarina glauca | swamp oak



Eucalyptus tereticornis | Blue Gum



Myoporum acuminatum | Waterbush



Acmena smithii | Lilly Pilly



Alphitonia excelsa | Red Ash



Eucalyptus longifolia | Woollybutt



Blechnum indicum | Swamp Water Fern



Carex appressa | Tall Sledge



Conospermum taxifolium | Scurvy Weed

BANKSIA WOODLANDS

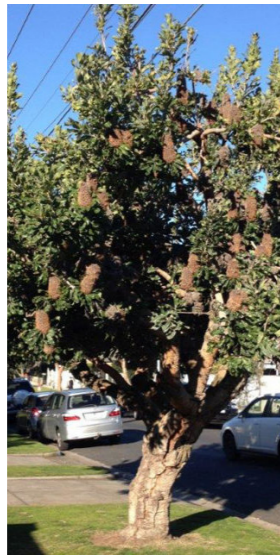


Trees

Understorey



Banksia ericifolia | Heath Leaved Banksia



Banksia serrata | Saw Banksia



Themeda australis | Kangaroo Grass



Leptospermum laevigatum | Coast Tea Tree



Ricinocarpos pinifolius | Wedding bush



Allocasuarina distyla | Scrub She-oak



Conospermum taxifolium | Smoke-bush



Cyathochaeta diandra | Sheath Rush



Banksia integrifolia | Coastal Banksia



Banksia oblongifolia | Dwarf/Rusty Banksia



Epacris longiflora | Fuchsia Heath



Banksia ericifolia | Heath Leaved Banksia



Dillwynia floribunda | Egg and Bacon Pea

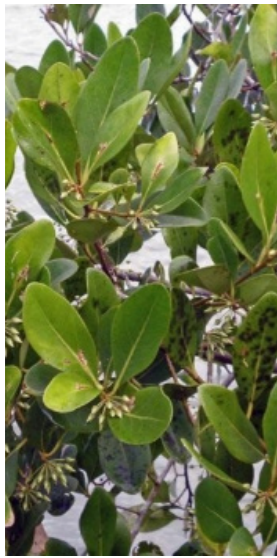


Lepidosperma filiformea | Rapier Sedge

COASTAL ESTUARINE SALTMARSH

Trees

Understorey



Aegiceras corniculatum |
Black Mangrove



Avicennia marina | Grey
Mangrove



Sclerostegia arbuscula |
Shrubby Glasswort



Casuarina glauca | swamp
oak



Sarcocornia quinqueflora |
Beaded Samphire



Melaleuca ericifolia |
Swamp Paperbark



Baumea juncea | Bare
Twig Rush



Cortaderia species |
Pampas Grass



Atriplex Semibaccata |
Berry Saltbush



3.4 BUSHFIRE MANAGEMENT

Designing to Reduce Bushfire Risk

The design and management of the ecological corridors, parks and open spaces is critical in the reduction of bushfire risk to the neighbourhoods and uses on the site.

Strategies for management of the landscape interface to neighbourhoods include:

- Establishing Asset Protection Zones (APZ) to neighbourhoods.
- Clarifying APZ for Special Fire Protection Purpose developments (SFPP) which has increased APZ dimensions. The areas as shown on the plan adjacent are indicative of maximum extents. The location of the SFPP uses will be developed in future stages of the project and as part of future Development Applications, at which stage the SFPP APZ will be clarified.
- Establishing ring roads around the neighbourhoods and confirming which urban roads will be performing the function of ring roads.

Managing landscape outside the APZs

It is part of the strategy of the site to manage the landscapes which form the ecological corridors with consideration of bushfire and reduce its risk as bushfire prone land.

It is not expected that protected coastal wetlands (and associated buffer zones), the coastal dune land, nor the midden site would need to be specifically managed to reduce fire risk due to the ecological sensitivity of these areas.

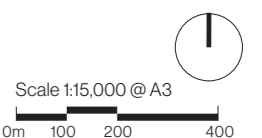
The management of the majority of the landscapes in corridors (as outlined in the page opposite) will include the regulation of tree and shrub planting extents and mowing areas of lawns and grasslands.

Additional methods of reducing bushfire risk in the corridors include selection of plant species for key interfaces which have favourable barrier-forming attributes and development of 'hydrated' landscape areas such as wetlands and bioswales.



LEGEND

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|-----------------------------|---|----------------------|---|
| Subject Site | Residential Asset Protection Zones | Land to be Dedicated | Coastal Wetlands - SEPP (Resilience and Hazards) 2021 |
| SFPP Asset Protection Zones | Recommended Additional Asset Protection Zones | Managed Landscape | Coastal Wetlands Proximity Area- SEPP (Resilience and Hazards) 2021 |
| | | Midden Extent | |



Asset Protection Zones and management strategies

The following controls outline management of the landscape interfacing the neighbourhoods.

Asset Protection Zones

An APZ is a buffer zone between a bush fire hazard and buildings. The APZ is managed to minimise fuel loads and reduce potential radiant heat levels, flame, localised smoke and ember attack. Key aspects of the APZ landscape controls include:

- Tree canopy cover should be less than 15% at maturity;
- Trees at maturity should not touch or overhang buildings;
- Tree canopies should be separated by 2-5m;
- Shrub planting should not form more than 10% of ground cover and be laid out with large discontinuities and gaps;
- Grassed areas to be kept mown; and
- Linking and ring roads should have an APZ on both sides.

Managed Landscape Areas

The majority of the ecological corridors and open space areas are to be managed to assist in reducing the potential extent of flames by slowing the rate of spread, filtering embers and suppressing crown fires. Key aspects of the managed landscape controls include:

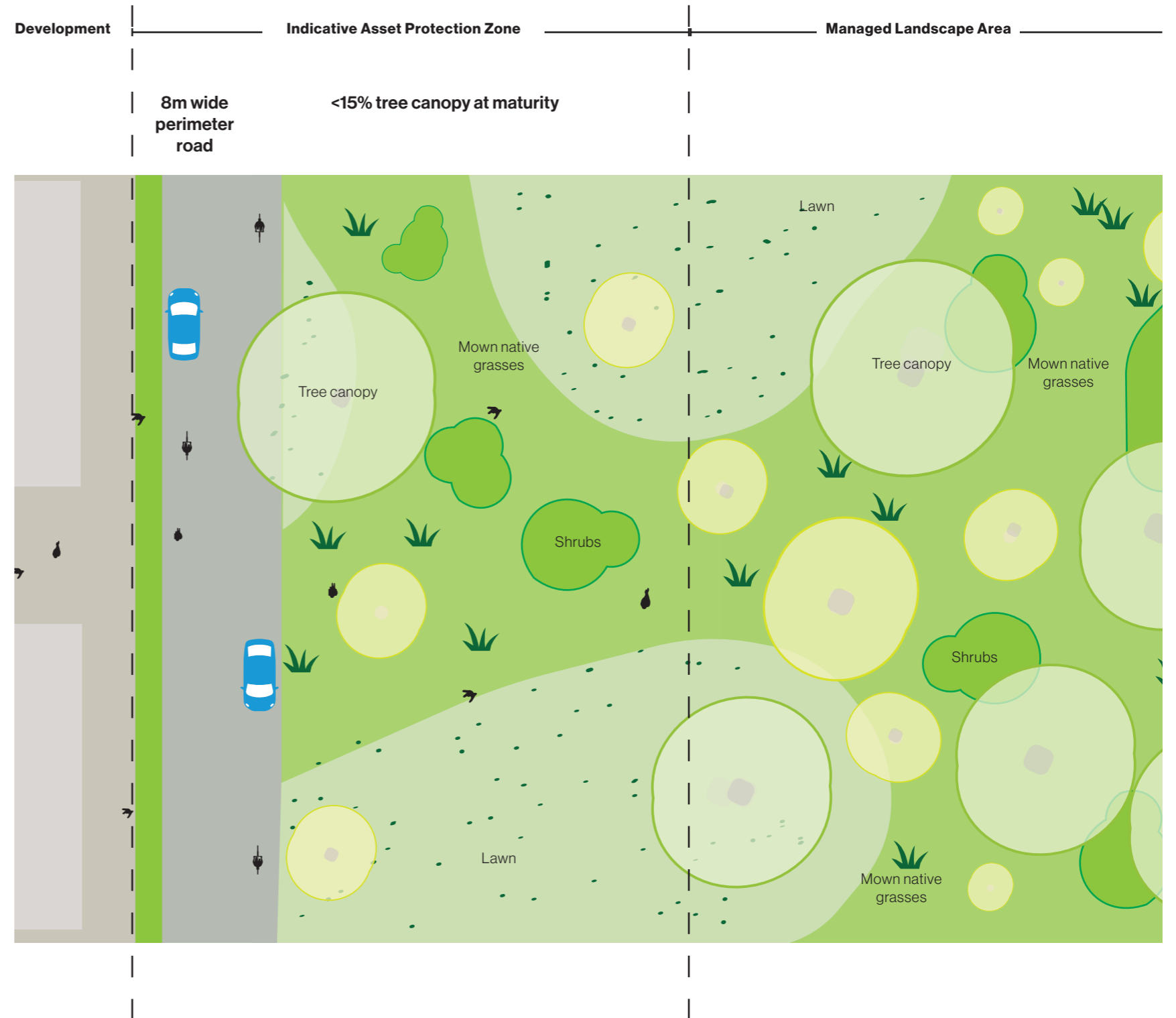
- Tree canopy cover should be averaged to be less than 30% at maturity;
- Tree canopies should not be contiguous across the corridor;
- Shrub planting should be laid out with large discontinuities and gaps; and
- Lawns to be kept mown and native grassed areas to be selectively and periodically mown.

Perimeter Roads

The developments interfacing ecological areas are bounded by perimeter roads. The Perimeter Roads are 8m wide two-way sealed road, formed part of the Asset Protection Zone (APZ). They create a separation between buildings and the boundary of the bush fire hazard as required by NSW Rural Fire Service.

Perimeter Roads are designed to allow safe access and egress for firefighting vehicles and residents during firefighting operation. They will also serve as everyday active transport corridors for pedestrian and cyclists.

In some locations the perimeter road function is provided by the main urban collector road or residential streets. These streets have been designed to accommodate the 8m wide clear carriageway.



3.5 WATER MANAGEMENT

Water Management Design Principles

The design of the water management system for the site will achieve a high quality of water filtration and cleaning and assist in flood management.

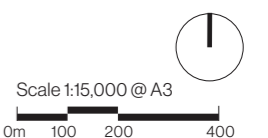
The water management strategies for the site will include three tiers of treatment.

- Primary treatment is provided to remove gross pollutants and litter (trash screens and GPTs)
- Secondary treatment is provided to remove finer particles (GPTs).
- Primary and secondary tier water treatments are through GPTs located in the neighbourhoods streets and parks.
- Tertiary treatment is provided to remove heavy metals, oils etc (wetlands/bioretenation). Tertiary tier water treatment in bio-swales as the edges of neighbourhood precincts, connecting to wetlands.
- The ecological 'green web' will be continued through the open spaces, local parks and waterways
- Water can be collected and stored for reuse in irrigation and uses such as supplementary water supply for the nursery
- Water flow can be connected to natural sand soil profiles to recharge the aquifer



LEGEND

- | | | | | |
|---------------------|---------------------|----------------------|---------------------------|-------------------------------|
| Subject Site | Ecological Corridor | Protected Wetland | Primary Water Treatment | Overland Flow Path |
| Existing Open Space | District Park | Wollongong (WG) Soil | Secondary Water Treatment | Potential Constructed Wetland |
| Local Park | | | Tertiary Water Treatment | Catchment Area |



Wetland and Bioswale Sizes

The following table summarise the recommended areas for bioswales and wetlands in the sub catchments on site.

Catchment	Catchment Area (ha)	Wetland Area (ha)	Bioswale Area (ha)
A	16.0 ha	0.30 ha	0.31 ha
B	29.36 ha	0.70 ha	0.54 ha
C	58.02 ha	1.20 ha	1.04 ha
D	43.61 ha	1.31 ha	0.80 ha
E	31.11 ha	1.12 ha	0.49 ha

Benefits to the Landscape

Water Quality for Habitat

The integration of water management systems through the urban environment and ecological corridors creates a holistic approach to the management and reuse of water.

The primary and secondary treatment of water in the neighbourhood streets will ensure that the water entering the bioswales and wetlands which are located in the open spaces and ecological corridors is a good quality, with any contamination, sediment or rubbish largely removed. The wetlands and waterways will further polish and assist in removing sediment and excessive nutrients which will make the water quality more suitable for the ecological and habitat function.

Bushfire Risk Reduction

The water bodies in the corridors also assist in creating damp areas and hydrated landscapes. The wetter areas can be used to manage bushfire risk by acting as a natural barrier to the spread and magnitude of fires.

Water Reuse

Water will be available for collection and reuse for irrigation of open spaces, reducing mains water demand for the precinct. Collected water can also be used for facilities such as nursery and other connected public amenities.



Flexible use open space as water retention basin for water harvesting during storm events

Salem State University | WagnerHodgson Landscape Architecture



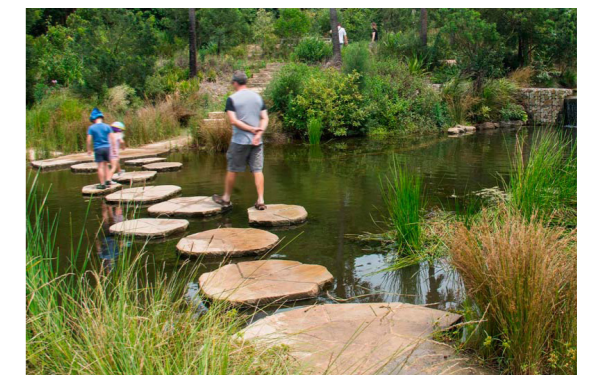
Bio-retention swale

Sunvale Community Park | Brimbank City Council



Urban wetlands for water collection and reuse

Little Bay Cove | McGregor Coxall



Stormwater collection areas provide opportunities for exploratory play

Sydney Park | Turf Design



Paperbark woodlands and wetlands

Lachlan Swamp Centennial Park



Integration of meeting and learning spaces

Naval Cemetery Landscape | Nelson Byrd Woltz Landscape Architects