



Artist's Impression: Children's playground set within native landscape plantings at Rockdale Bicentennial Park (trees and landscaping shown at maturity).



8.0 LANDSCAPE DESIGN

THE LANDSCAPE DESIGN STRATEGY FOR THE PROJECT AND ITS SURROUNDING GREEN SPACE IS ONE OF REGENERATION, REHABILITATION AND REVITALISATION. IT WILL DELIVER THE REGENERATION OF A RUN-DOWN ECOSYSTEM, REHABILITATION OF AN ECOLOGICALLY SENSITIVE GREEN SPACE, AND THE REVITALISATION OF A LOCAL COMMUNITY AND ITS CONNECTED LOCAL OPEN SPACE.

The Project comprises several key planting character zones through areas of sandy soils, freshwater, estuarine reedlands and swamp forests.

Major green open spaces at Rockdale Bicentennial Park and Marsh Street Park provide opportunity for broader revegetation and rehabilitation whilst incorporating areas for active and passive open space, play and general relief from the urban environment. The landscape design also aims to revitalise local amenity through the inclusion of areas for cultural and community renewal such as the cultural circuit, where seasonal colour is on display year-round.

All of the regenerated areas within the parklands are supported by tree, shrub and understorey planting that creates a revitalised space for people, animals and the invertebrates and pollinators that help to create a successful urban green space.

The ATC extends from Scarborough Park in the south to Muddy Creek in the north via a connected, green corridor which aims to reinforce Indigenous vegetation throughout the area and planting will respond to the historic landscape character that the route traverses.

Streetscapes are reinforced with tree and understorey planting that reflects the existing streetscape character on President Avenue, West Botany Street, Civic Avenue and other local streets.

Planting at facilities will provide essential shading and screening with density, size and texture of planting helping to reinforce the overall architectural narrative. Planting within and around MOC1 will support the reinstatement of any Green and Golden Bell Frog habitat that is disturbed during the undertaking of groundworks.

The **regenerating, rehabilitating** and **revitalising** planting selections have been derived from species of the historic ecological communities that are present on site, and native wildflowers and bush garden plants found throughout the wider Sydney region.

8.1 Landscape design approach

The sheer scale of the Project presents a rare opportunity to provide a landscaped parkland that is integrated with both the natural landscape systems and the inherent cultural and historical values of Connection to Country and the wider city itself as described in *Section 5*.

A holistic approach to landscape and planting design has been developed to assist in delivering the key outcomes outlined on this page.



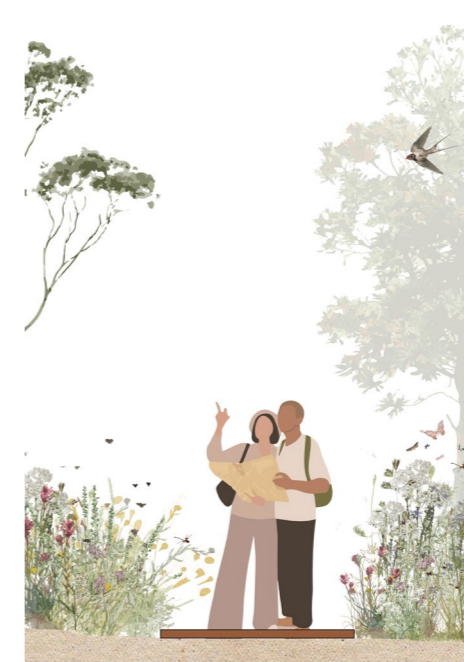
Planting to rehabilitate

- Use planting to assist in rehabilitating and restoring hydrological networks within the site
- Planting of a variety of native species that respond to site conditions and inspired by the historic ecological communities
- Increase canopy coverage and trees on site to reduce urban heat island effect and ameliorate climate change related issues. A diverse and layered tree canopy will support the ecological approach to the site
- Use regenerative planting to heal the ecosystem of the green corridor while regenerating human interaction with nature
- Use of native planting to increase spatial and taxonomic diversity to encourage further fauna diversity
- Creation of native nature and bush gardens to create a "Wow factor" to improve the user experience through floral and colour diversity and education.



Planting to re-inhabit

- Planting to encourage food, forage and shelter for endemic fauna and pollinator species
- Provide habitats for migratory birds that leverage off the existing Towra Point and Rockdale wetland systems
- Retain existing mature trees where possible.



Planting to re-vitalise

- Provide an ecologically rich open space asset for the health benefits of local residents.
- 'Wow factor' planting to create a destination for people
- Indigenous nature and bush garden to help with the exchange of cultural values and ideas.
- Create moments of education about land use, settlement and Indigenous history of place.
- Reinforce open space strategy of passive and active recreation through planting.

8.2 Landscape design principles

The landscape design responds to and enhances the surrounding landscape context and the built environment.

The design incorporates the fundamental objectives of landscape planting design in urban and road environments including:

Integration with local setting

The design maintains and enhances existing landscape character and vegetation patterns.

Ecologically sound

The design uses local species from existing and adjoining plant communities and assists in protecting and recovering local biodiversity.

Vegetation has been selected to draw upon threatened species and vegetation communities identified in Appendix S of the EIS. Species selection for the parkland includes trees suitable for Grey-headed flying fox foraging, which include banksias, eucalyptus and paperbark trees.

Add character and value

The design responds to and draws upon the existing and former landscape patterns of the area. The landscape patterns form part of the broader cultural landscape as described in *Section 5* of this UDLP.

Low maintenance and cost effective

The design utilises existing site soils and local robust and durable plant species. Revegetation across the Project will be achieved through direct planting of containerised plant stock into prepared planting areas, which will facilitate rapid establishment of new landscape installations.

Safety

Respect clear zone and safe sight distance setbacks to avoid the creation of hidden public spaces, while maximising passive surveillance opportunities in accordance with CPTED principles.

8.3 Landscape design themes

The landscape design will assist in delivering some of the design themes developed for the Project as described in *Section 5* of the UDLP. These are also described in further detail within this section of the report.

Connection to Country

Planting will be designed to enhance and celebrate 'Connection to Country' and recognise the pre-1788 vegetation of the area. Bush trails and gardens have been included to provide an intimate experience with the native landscape.

A 'Country-centred' approach has been adopted for the landscape design that prioritises natural systems that include people, animals, resources and plants equally – similar to an Aboriginal world view.

Reference local vegetation communities

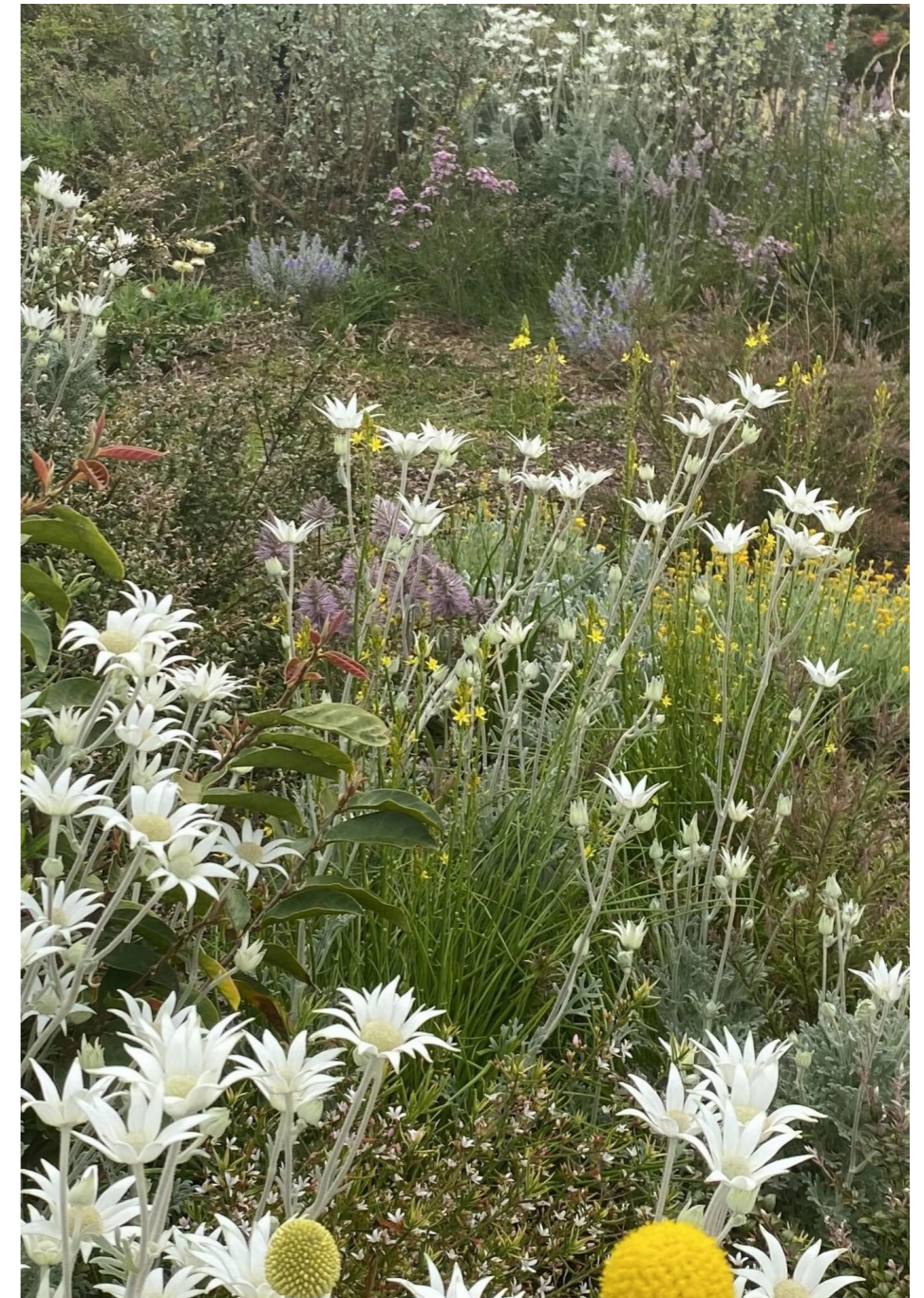
The Project will remediate the site and re-establish naturalised conditions, drawing upon vegetation communities that would have once existed in the area which has dramatically changed through land reclamation, industrialisation and infrastructure.

Establish an urban tree canopy

In conjunction with vegetation typologies, a diverse and layered tree canopy will support the ecological approach across the Project.

Tree canopy structure

With the objectives of the Urban Tree Canopy Guide in mind, the landscape design seeks to maximise tree canopy coverage with a diverse tree canopy that supports the landscape typologies and intended uses across the site.



Native garden planting - JIWAH (Image source: JIWAH)

8.4 Rehabilitation of location vegetation communities and the environment

Sydney has a temperate climate characterised by warm summers and cool to mild winters, with rainfall patterns generally highest closest to the coast. In the Project area, the mean annual rainfall is approximately 1100-1200 millimetres per year.

The pre-European landscape of the Botany area was an inter-dunal system of freshwater ponds, sand dunes, marshlands, swamp forests and paperbark woodlands that extended from the Cooks to Georges rivers. The natural environment provided a habitat rich in biodiversity and abundant in food for the Bidjigal and Kameygal clans of the Dharug language group who hunted in this area.

This Country was a bush 'larder' and was described as a 'paradise lost' by researchers of Sydney's early history.

Historic records paint a picture of a landscape that was once highly floral and diverse. Rows of dunes ran parallel to the shore, with bands of Banksia Scrub and Swamp Forest. Other areas were wooded with Dry Forest, with a green carpet of ferns and grasses beneath the canopy. The landscape design will reference and, where possible, conserve vegetation communities that once occupied this area.

8.4.1 Connection to Country

Traditionally cognitive mapping by Aboriginal people was done through walking on Country and learning about important sites, cultural lore, and wayfinding through storytelling. Connection to Country prompts biophilic design which considers the innate relationship between people and nature and led to the development of the landscape co-design principles that builds on the cultural landscape approach outlined in *Section 6.6* which are:

- Sharing space:
 - No being has a greater or lesser right to any inhabited space
 - Co-habitation and complimentary existence is a beautiful and mutually beneficial relationship.
- Connection reflected:
 - We are all connected
 - If we look close enough we can see those connections reflected
 - Bond with the natural surroundings to the connection.
- Responsibility is privilege:
 - We all have a responsibility to each other
 - Our responsibility stretches from our ancient past and well into the future
 - A connection to nature and systems that sustain us is a privilege and the responsibility of caring for these natural systems benefits and enhances all living things.

8.4.2 Vegetation communities

Based on an understanding of the surrounding remnant vegetation communities, as well as an analysis of geology, soils, hydrology and cultural knowledge (refer to *Section 3*), the landscape design acknowledges the early vegetation found along the alluvial basin of Botany Bay, which would have comprised freshwater swamp and woodlands, estuarine swamp and coastal heath.

As part of the design process, the characteristics and species profiles of the following planting communities have been drawn from:

- Coastal Swamp Forests
- Coastal Heath and Scrub
- Coastal Freshwater Wetlands
- Estuarine Reedlands.

The planting design has been informed by these vegetation communities and implemented through site specific landscape typologies.



Coastal Swamp Forests

Coastal swamp forests are found in areas of impeded drainage near coastal swamps, lagoons and along low-lying drainage flats. This open forest is dominated by swamp mahogany (*Eucalyptus robusta*) with a smaller tree layer of swamp oak (*Casuarina glauca*) and paperbarks (*Melaleuca linariifolia*, *Melaleuca styphelioides*). A distinct mesic element is present in the understorey, with cheese tree (*Glochidion ferdinandi*) and cabbage tree palm (*Livistona australis*) most prominent. Climbers such as snake vine (*Stephania japonica*) and common silkpod (*Parsonia straminea*) may be found winding around tree trunks and fallen branches.

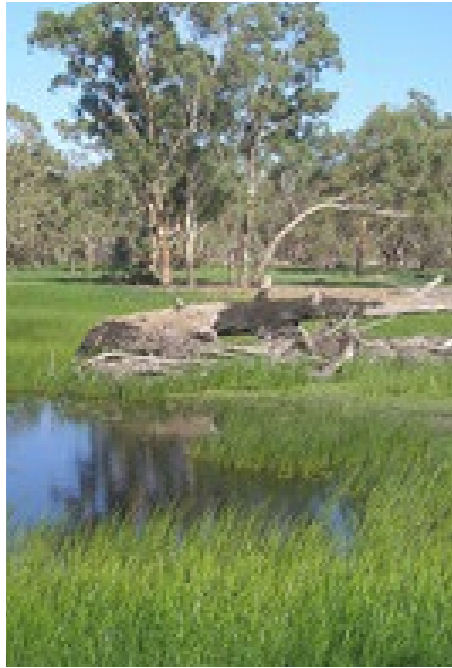
In the Sydney area this community is restricted to elevations between one and six metres above sea level.



Coastal Heath and Scrub

This low dense scrub is found on coastal sand mass frontal dunes and beach ridges along the eastern coastline of New South Wales. Its coast tea-tree (*Leptospermum laevigatum*) and coastal wattle (*Acacia longifolia*) are pruned by the prevailing winds that buffet these exposed scarped dunes. Throughout the Sydney metropolitan area this assemblage suffers from infestation of bitou bush (*Chrysanthemoides monilifera subsp. rotundata*). Some of the small patches that remain are derived from native plantings as part of dune stabilisation works and bush regeneration.

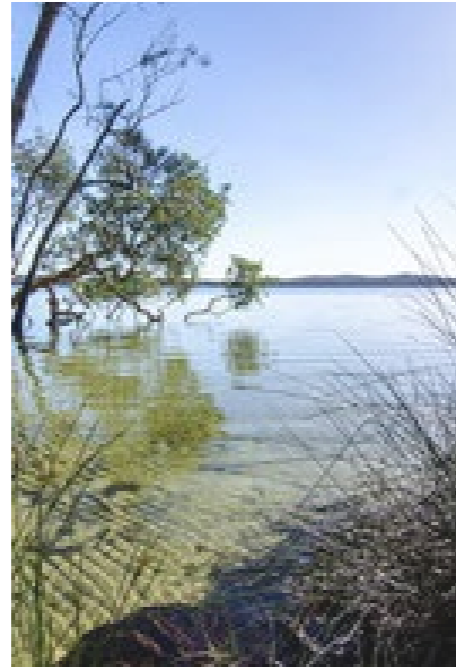
As a result some scrubs are species poor. More diverse remnants include salt-tolerant succulent herbs and grasses, several of which are unique to these environments.



Coastal Freshwater Wetlands

Coastal Freshwater Wetland is associated with freshwater lagoons and swamps on alluvial flats and sand depressions across the New South Wales east coast. Lagoons have fluctuating levels of standing water that gives rise to a varied assemblage of species. They include a range of sedges, rushes and aquatic herbs with woody shrubs and small trees found only on the margins of the wetlands in low abundance.

In the Sydney metropolitan area Coastal Freshwater Wetland is most commonly found at low elevations less than five metres above sea level on coastal plains and flats. Many of the remaining swamps are situated amongst intensely developed urban land.



Estuarine Wetlands

Estuarine Reedland is characterised by tall dense swards of the common reed (*Phragmites australis*). It is found in environments inundated by saline or brackish water. These include low-lying swamps on riverbanks, river flat depressions, and banks on coastal lagoons that are open to tidal influence. This community is commonly encountered on the landward side of salt-marsh flats. Several salt-tolerant species are shared with salt-marshes including sea rush (*Juncus kraussii*), bare twig-rush (*Baumea juncea*) and the small herb creeping brookweed (*Samolus repens*).

8.4.3 Water sensitive urban design

Water Sensitive Urban Design (WSUD) is most simply defined as the sustainable management of water within urban areas through intelligent and integrated design.

The Project has considered the urban water cycle as a whole and embedded the following best practice WSUD principles into the landscape design in accordance with MCoA E139:

- Maximise the use of 'soft' rather than 'hard-water' engineering solutions
- Reduce run-off flows to minimise on-site flood risks
- Treating tunnel water to a standard suitable for discharge to receiving waters
- Protect natural systems by treating stormwater before discharge to receiving waters
- Integrate stormwater treatment into the landscape to enhance the recreational and aesthetic quality of the urban environment
- Maximise capture of stormwater roof run-off for grey water re-use within the MOC sites
- Design the GGBF habitat to be self-sustaining within the stormwater catchment of the parklands with minimised use and need for potable water
- Introduce water quality treatments such as bioretention basins and recirculating wetlands at Rockdale Bicentennial Park to mitigate some of the impacts associated with existing untreated stormwater which results in chronic weed growth.

8.4.4 Existing and replacement trees

Under the requirements of MCoA E38, any work associated with the CSSI must limit the clearing of native vegetation to the greatest extent practicable.

The Project has sought to avoid and minimise any impact and incursion into the Environmental Exclusion Zone that is prescribed in the EIS (refer EIS Chapter 12 – Biodiversity). The intent of the Environmental Exclusion Zone is to protect existing remnant and endangered vegetation communities that are located adjacent to the Bicentennial Park Ponds and include the following as noted in MCoA E40:

- PCT 1232 – Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion – Coastal Swamp Forest
- PCT 1795 – Swamp Mahogany – Cabbage Tree Palm – Cheese Tree – Swamp Oak tall open forest on poorly drained coastal alluvium in the Sydney basin – Coastal Swamp Forest
- PCT 1808 – Common Reed on the margins of estuaries and brackish lagoons along the New South Wales coast – Coast Swamp Forest.

Separate to the UDLP, a Flora and Fauna CEMP Sub-plan has been prepared for the Project. The sub-plan includes pre-clearing surveys as well as recommendations and mitigation measures that will be implemented during Project construction.

An arboricultural assessment of all trees within the Project boundary has been prepared in the form of a Tree Report/s to satisfy the requirements of MCoA E146 which is also separate to this UDLP. The Tree Report has identified that approximately 1401 trees are required to be removed.

As a minimum, the Project will provide a net increase of (n+1) replacement trees with a minimum container size of 75L to meet the objectives of MCoA E145 and E148. The final amount of replacement trees is subject to detailed design and development. All replacement trees will be provided within the Project works boundary to fulfil the requirements of MCoA E147 and maximise the benefits an enhanced tree canopy across the open space corridors to connect with and align to the objectives and opportunity sites identified in *The Sydney Green Grid*, which include:

- The Cooks River Open Space Corridor (identified as item 6)
- Rockdale Wetland Open Space Corridor (identified as item 11).

8.5 Biodiversity, habitat and fauna

The Project follows an ecologically important open space corridor that extends from Sydney Park to the north and Towra Point Wetlands in the south. The EIS (Chapter 12 - Biodiversity) identified that the corridor is likely to function as 'stepping stones' between habitats for relatively common urban wildlife.

The site's geographic location provides the opportunity to contribute to local wildlife and broader migratory bird habitats, some of which extend as far as Japan, China, Siberia and other parts of Australia.

To support and improve biodiversity and habitat within the Project, the following outcomes have generally been adopted in the design:

- Protect existing vegetation and habitat by minimising the extent of clearing
- Re-establish the historic vegetation communities of the site
- Rehabilitate any disturbed areas as a result of the project works
- Improve the water quality and vegetation species to promote habitats for migratory birds that leverage off the existing Towra Point and Patmore Swamp Wetlands
- Promote opportunities for education about natural systems, ecology and endangered flora and fauna
- Provide reinstated habitat areas for the Green and Golden Bell Frog at Marsh Street Park
- Promote habitat and movement corridors for micro-bats and Grey-headed flying fox
- Provide a strategy to rehabilitate Patmore Swamp (south of President Avenue).

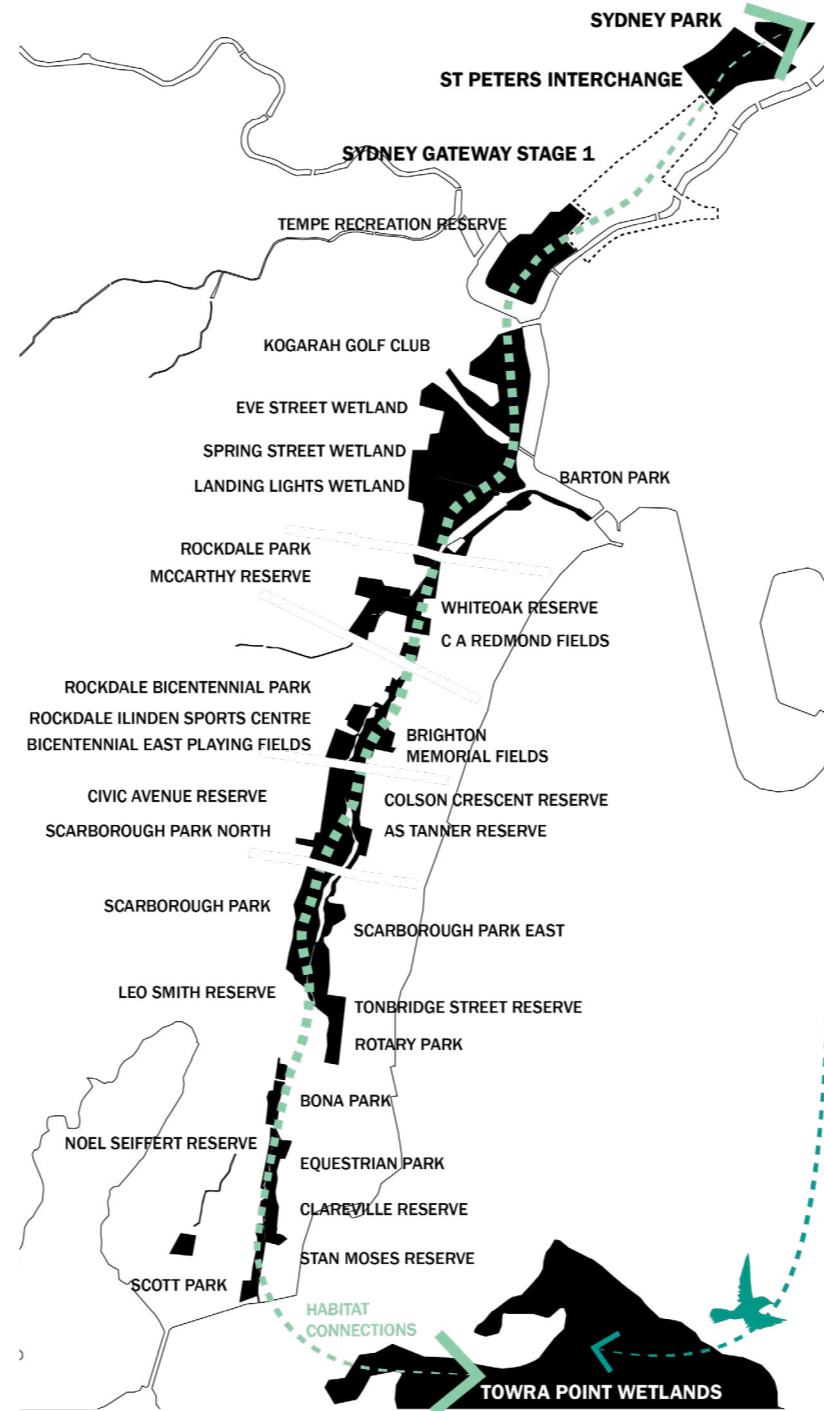


Figure 8-1: Open space corridor and migratory bird patterns

Migratory birds

The Landing Lights Wetland (within 500 metres of the Project) is known to provide habitat for the following migratory species listed under the EPBC Act:

- *Calidris acuminata* (Sharp-tailed Sandpiper)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Limosa limosa* (Black-tailed Godwit)
- *Xenus cinereus* (Terek Sandpiper).

These species do not breed in Australia. They migrate south for the southern summer, using wetlands, shores and exposed mudflats for foraging. Areas such as Patmore Swamp, given its size, provide good opportunities for foraging bird species which has been considered as part of the planting design strategy.

Patmore Swamp rehabilitation

Patmore Swamp is identified as the area of wetlands in Scarborough Park south of President Avenue. To meet the requirements of MCoA E58, a planting strategy with details of the selected planting and species is provided in Section 8.8.4.

Grey-headed flying fox

The Grey-headed flying fox (*Pteropus poliocephalus*) is listed as vulnerable under the BC Act and EPBC Act. The EIS assessment (Chapter 12 - Biodiversity) identified that roosting was considered likely to occur within the Project area.

The Grey-headed flying fox is known to feed broadly on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. The EIS identified that a number of existing tree species within Rockdale Bicentennial Park provide food which include *Ficus hillii*, *Eucalyptus robusta* and *Eucalyptus botryoides x saligna*, among other potential food sources.

The planting design and species selection for Rockdale Bicentennial Park has taken this into consideration and is outlined in further in this section of the UDLP.

Beyond the considerations for habitat and foraging, the EIS also identified that road and pedestrian and cycle path lighting would be downward facing to minimise light spill, therefore reducing disturbance to the Grey-headed flying fox. This has been a consideration for the lighting design described in this section.

Microbats and bat boxes

The Sydney Basin supports a rich microbat fauna of at least 19 species. Majority of microbat species roost during the day in tree hollows, under bark and in buildings. Some are predominantly cave-roosting, sheltering during the day in caves, mines, tunnels, culverts and stone basements.

The Southern Myotis (*Myotis macropus*), which is a threatened cave-roosting species, was identified in the EIS assessment (Chapter 12 - Biodiversity) with particular reference to roosting opportunities from the existing stormwater culvert underneath President Avenue.

The Project will provide bat boxes or alternative suitable habitat within the replacement box culverts that cross President Avenue at Scarborough Park. This has been achieved through the preparation of the Flora and Fauna CEMP Sub-plan which provides a mitigation strategy that will be implemented when the existing culvert is decommissioned during construction.

Bicentennial Park Ponds rehabilitation

With the draining of the wetlands in the late 19th century for land reclamation, and more recently industrial and residential development, the Bicentennial Park Ponds today is of poor quality, with algal blooms, low biodiversity and extensive weed infestation.

A recirculation strategy has been developed for the wetlands to improve the water quality and performance of the wetland as part of the parkland. The key initiatives that underpin the strategy are outlined below:

- Recirculation of the open water system through a series of treatment marsh areas that will resemble the landscapes of pre-European times
- The water recirculation will have a nominal 25-day residence time in the ponds before re-entering the wetlands to remove excessive nutrients and nuisance algae that have resulted from untreated stormwater directly entering the wetland
- A range of aquatic and ephemeral vegetation zones / benches at various levels will be created, including:
 - Ephemeral zone: 100-300mm above Normal Water Level (NWL), this zone will include trees
 - Shallow marsh: 0-150mm below NWL, including smaller herbaceous species
 - Deep marsh: 150-350mm below NWL, including tall herbaceous species
 - Submerged marsh: 350mm+, including submerged herbaceous species.

The recirculation system is integrated within the parkland design at Rockdale Bicentennial Park as demonstrated on the urban design concept plans in *Section 7.3.6* of this UDLP.

Green and Golden Bell Frog

One of the Project's objectives is to reinstate habitat areas for the critically endangered Green and Golden Bell Frog (GGBF) at Marsh Street Park to meet the requirements of MCoA E44.

A herpetologist report was prepared by Ecological Australia (on behalf of TfNSW) in June 2020 to outline the requirements for planning for frog habitats, and to provide key criteria for the implementation of GGBF habitat at Marsh Street Park which included the following:

- Recreate green and golden bell frog suitable habitat in the reinstatement area at Marsh Street Park
- Reinstatement habitats in a condition consistent to that prior to development
- Ensure reinstatement areas provide sufficient breeding, dispersal and aquatic habitat to reflect pre-construction conditions
- Ensure the habitat areas are connected to the existing ponds in the sites south-west corner, and not impede the movement or use of the site by the GGBF population.

The report also made recommendations to ensure habitat areas are suitable for the GGBF, including:

- Incorporating additional wetlands in mosaic throughout reinstatement area
- Integrating mass plantings of shrubs and mixed canopy dispersal/migratory
- Ensuring plantings proposed include additional tussocky grasses and swales that complement tussocky grasses
- Introduce design elements around reinstated areas to isolate/reduce human activities, e.g. prickly plantings or a fence around vegetation/ waterbodies
- Avoiding barriers: vegetation lined waterbodies and increase frequency and reduced distance of water bodies
- Integrate sufficient grassland and migration areas - migratory activity is primarily across open environments with patches of shelter (vegetation, rocks, logs).

The planting design outcomes for the GGBF ponds are described in *Section 8.8.1*. For the overarching design of the parkland including the integration of GGBF ponds, refer to *Section 7.2.3*.

8.6 Technical criteria for landscape works

Soil preparation

Due to the varying conditions throughout the Project, a variety of soil preparation treatments have been developed to support the landscape design.

The following section describes the project wide soil preparation treatments which will be commonly used across the Project as well as any site specific requirements related to cut and cover structures.

Specifications for all soil mixes have been developed by a specialist soil scientist to suit the various site conditions across the Project. All sub-grades will be tested for suitability to support plant growth and ameliorated in accordance with test results prior to installing topsoils.

Organic wood chip mulch will typically be applied to all planting areas to a depth of 75 millimetres. The wood chip mulch will be derived, where possible, from trees and shrubs removed through clearing works on site. Any shortfall will be made up with imported wood chip mulch.

To determine soil preparation treatments for constructed landscapes, the starting consideration is to understand site and sub-grade conditions. There are four basic conditions that occur consistently across the Project:

- Over existing site soils
- Over formed embankments as part of the roadwork's earthworks formation
- 'On structure' conditions where landscape will be installed over cut and cover structures at the tunnel portals
- Over former landfill areas.

For the first two conditions, organic soil mixes are placed to a depth of 150mm for turf areas and 300 millimetre for massed planting areas. The majority of planting will be native grasses and shrubs in 150 - 200 millimetre deep containers planted directly into the prepared soil bed. Where larger trees are installed, they will vary container sizes typically ranging from 25 litres or 200 litres. These will be installed in over-excavated holes typically three times the diameter of the root ball and 100 millimetre deeper, in accordance with TfNSW specifications.

For 'On-structure' landscapes, deeper soil profiles will be provided up to 1m deep which will support broad revegetation and a tall urban tree canopy based. These types of landscapes can be considered to be similar to the growing conditions of the Sydney sandstone landscapes, but with a deeper soil profile. This will include a 1000 millimetre minimum vegetation layer comprising drainage cell layers, geotextile drainage fabric, coarse washed river sand, 80:20 sand/soil mix and a final layer of organic weed-free soil pre-blended with fertilisers and proprietary soil additives. These are located behind the tunnel portals at President Avenue.

For areas over former landfill, a Remediation Action Plan has been prepared to determine the appropriate method of containment or 'capping' to ensure safe and useable open space that supports long term plant and tree establishment. The majority of planting areas in these locations will typically include 800 millimetre depth of topsoils comprising a 300 millimetre deep A-horizon and 500 millimetre deep B-horizon. A marker layer comprising geosynthetic fabric or similar will be placed below the topsoils as a warning device in the future.

Landform, earthworks and slope stabilisation

All soft landscape areas across the Project (excluding residual land) will be stabilised by containerised massed planting, in prepared planting areas or turfing over a prepared turf underlay.

Along President Avenue and adjoining streets, where typical road related surface works occur, new earthworks will be integrated with existing cut and fill embankment formations in order to minimise existing vegetation loss and merge with existing landform profiles.

At Marsh Street Park, the majority of landforms will be newly created. They will be designed to achieve the best parkland and open space outcome within the confines of the proposed tunnel infrastructure requirements of the Project.

At Rockdale Bicentennial Park, the existing parkland and topography will be modified to integrate the enhanced facilities whilst tying in smoothly to all adjacent boundary conditions.

Typically, all earthworks and landform profiles have been designed to meet the following requirements:

- New cut and fill embankments will be no steeper than 1 in 4 (where possible) in accordance with EIS and SWTC requirements and will be trimmed and profiled to blend with the existing embankment formations
- Turf slopes have been designed to a maximum slope of 1 in 4 for maintainability
- Planted slopes do not exceed 1 in 3, except where locally required due to constraints a maximum slope of 1 in 2 have been considered. Steeper slopes will include stabilisation matting such as jute mesh
- The slopes of batter faces vary in response to the existing landform. The slopes of batters have been designed to be flatter where the existing landform is shallowest and steeper where existing landform is deepest, where space permits
- All fill embankments will be vegetated, either by planting, turfing or revegetation, as appropriate to the location and surroundings of the embankment and plant species
- The tops and bottoms of batters will be rounded and feathered into the adjacent landform. The ends of cuttings must be rounded off and feathered into the adjacent landform to avoid an artificial character. The ends of batters in cuttings must be rounded and the batter slope progressively flattened over an appropriate distance, to blend the batter into the surrounding landform
- Embankments will be graded out at the bottom to reduce the visual impact of any obvious junctions between the fill material and the natural landform, and to assist in avoiding an artificial character to embankments
- All cut and fill embankments will be revegetated using containerised plant stock in prepared planting areas. The majority of new planting will comprise frangible native grass and shrub species and grasses, supplemented with select tree species beyond clear zone safety setbacks
- All shared pedestrian and cyclist pathways will have sufficient shoulders and batter grades to avoid the use of cycle fencing, where possible
- Margins and transitions to wetlands incorporate best practice principles for safety benches soft slopes generally 1 in 5 or softer.

Specifications and pot sizing

Revegetation across the Project (excluding residual land) will be entirely through direct planting of containerised plant stock into prepared planting areas. All work will generally be undertaken in accordance with TfNSW standard specifications, including:

- D&C R178 Vegetation
- D&C R179 Landscape planting.

The majority of planting will be:

- 50mm 'Tube' containers (50mm x 50mm x 125mm deep)
- 75mm 'Tube' containers (75mm x 75mm x 125mm deep)
- 150mm containers - 'semi advanced' (150mm x 150mm x 150mm deep)
- 200mm containers - 'advanced' (200mm x 200mm x 200mm deep)
- 25 litre container - 'super advanced' (300mm x 300 x 300mm deep)
- 75 litre container - 'semi-mature' (470mm x 440mm x 400mm deep)
- 200 litre container - 'semi-mature' (700mm x 550mm x 600mm deep)
- 400 litre container - 'mature tree' (820mm x 600mm x 600mm deep)
- 1000 litre container - 'feature tree' (1500mm x 600mm x 600mm).

All revegetation areas will be planted in dense arrangements with densities varying between four to eight plants per square metre depending on the location and application.

All replacement trees will be installed with a minimum container size of 75 litres to meet the objectives of MCoA E148.

8.7 Approach to progressively revegetate the project

Landscape installation works will occur progressively throughout the Project as areas and work sites become available.

A construction program has been provided in *Section 15.1* which outlines how the Project would progressively revegetate areas. This program is indicative only and demonstrates the principles which will be adopted by the Project.



Artist's impression: View north overlooking the intersection and tunnel portal at President Avenue (trees and landscaping shown at maturity).



Artist's Impression: GGBF ponds at Marsh Street Park (trees and landscaping shown at maturity).

8.8 Planting design strategies

A holistic approach to landscape and planting design has been adopted across the Project to achieve the design outcomes. Landscape planting has been devised to respond to the site and is influenced by the following criteria:

- Proposed vegetation typologies relating to the pre-European vegetation communities
- Local character species successfully planted in adjacent sites
- Proven performance for manufactured site topography, micro-climate and soil makeup
- Suitability within public parklands, street side verges and managed motorway environments, and
- Compatibility with WSUD systems.

The Project has been divided into the following precincts to describe the tailored landscape design approach in response to local site conditions and constraints:

- Marsh Street Park- including MOC1 and public parkland
- Streetscapes along President Avenue and adjoining streets including MOC3 on West Botany Street
- The ATC corridor (north and south)
- Rockdale Bicentennial Park
- Patmore Swamp in Scarborough Park.

A description of the planting design strategy for each zone has been provided on the following pages including key considerations for planting design and plant species selection.



Figure 8-2: Overall Master Plan: Not to scale



8.8.1 Marsh Street Park

Arncliffe Motorway Operations Complex (MOC1)

Planting at the facility aims to prioritise the use shading and screening with density, size and texture of planting to compliment the architectural design of the buildings described in *Section 12.1*.

The area for planting within the facility is limited by the operational components and building required to safely operate the motorway. Screening and buffer planting is primarily achieved along the outside perimeter of the buildings in the adjacent parkland and open space areas.

Marsh Street Park

The planting design approach for the new parkland is to create a park with active and passive recreation spaces that are carved out of re-established native vegetation communities. The aim is to create a balanced diversity and exchange between the recreational uses of the park and the endangered GGBF habitat that has been design.

The Project will remediate the site and establish naturalised habitat conditions, drawing upon vegetation communities that would have once existed in the area which have dramatically changed through the development of the golf course and infrastructure works.



Figure 8-3: Marsh Street Park precinct plan. Scale 1:5000



8.8.1.1 Landscape design strategies

Landscape typologies

Landscape planting within the MOC1 and Marsh Street Park is composed of distinct typologies as shown below. Each typology has been developed to respond to the new site conditions and has been influenced by the following criteria:

- Alkalinity of existing site soil material guiding the selection of appropriate plant species
- Compatibility with habitat vegetation types for the GGBF
- Proposed vegetation typologies relating to the pre-European geology and vegetation of the site and surrounding coast areas which include coastal heathlands and freshwater swamps
- Proven performance for manufactured site topography, microclimate, soil makeup/s and existing site soil conditions
- Suitability within public parklands and managed motorway environments
- Compatibility with wetland systems and ephemeral marsh zones.

The landscape typologies draw upon the characteristics and species profiles of plant communities that once occupied the site and surrounding region.

Planting arrangement / Open space structure

The arrangement of planting and turf areas has been developed to provide appropriate habitat in support of the GGBF, as well as amenity for park users. The diagram below illustrates how the planting structure has been applied to reinforce the intended use in each zone in terms of the overall spatial and planting structure (height, density, amenity).

Tree canopy

The arrangement of the tree canopy will inform the character and structure of vegetation and open space that surrounds it. A diverse tree canopy has been developed to support the open space structure based on the native vegetation communities list above. The general tree planting types include:

- Angophora costata
- Angophora floribunda
- Banksia integrifolia
- Casuarina cunninghamiana
- Corymbia maculata
- Eucalyptus robusta
- Hymenosporum flavum.



Figure 8-4: Landscape typologies diagram



Figure 8-5: Open space structure diagram



Figure 8-6: Tree canopy diagram

GGBF Habitat

A key focus of the parkland design is the restoration of a stable and healthy GGBF habitat, which includes several planting typologies:

- Bioretention and marshland planting to help act as breeding habitat
- Mixed canopy and shrub endemic planting to help create space for foraging
- Mixed native grassland and turf planting for dispersal and migratory behaviour.



LEGEND

- Turf
- Low Planting
- High/Bulky Planting
- Wetland

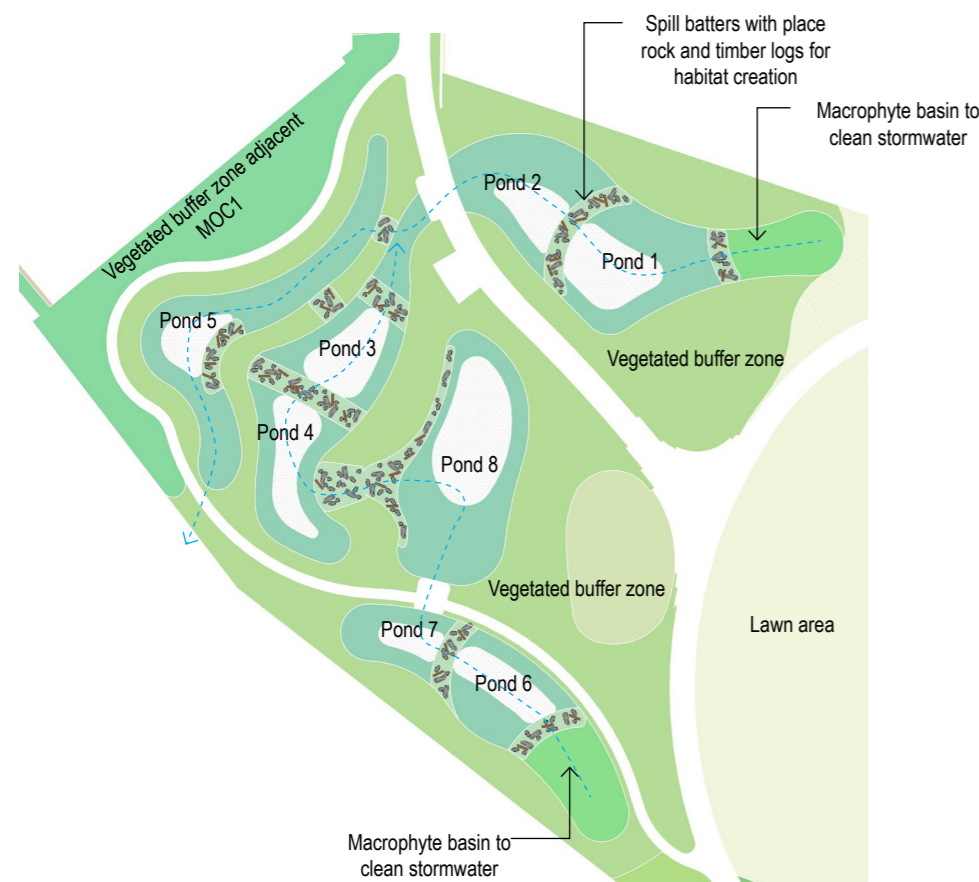


Figure 8-7: GGBF Planting strategy

Figure 8-8: Typical section through tiered GGBF ponds

Landscape strategy plan

In conjunction with the landscape strategies, the following plan highlights the key landscape design approach that has been incorporated into the design.

The plan illustrates the composition of main landscape design elements which typically include:

- Publicly accessible turf areas
- Landscape revegetation areas
- Proposed tree planting locations
- Buffer / screen planting areas
- Prominent contextual and filtered landscape views.

For descriptions of Project elements, refer to concept plans in Section 4 of this UDLP.

TREE CANOPY, TURF AND PLANTING AREAS DESIGNED TO INTEGRATE AND VISUALLY BLEND WITH THE EXISTING ENVIRONMENT

NEW, TALL NATIVE TREE CANOPY TO PROVIDE VISUAL AMENITY TO DRIVERS AND PEDESTRIANS ALONG MARSH STREET

BULKY SCREEN PLANTING SURROUNDING THE EXISTING M8 FACILITY AND MOC1.

LANDSCAPING WITHIN THE OPERATIONAL FOOTPRINT OF MOC1, WHERE SPACE PERMITS TO VISUALLY INTEGRATE WITH THE PARKLAND SURROUNDS AND PROVIDE AMENITY FOR WORKERS.

ELEVATED SHARED PEDESTRIAN AND CYCLIST CROSSING AND LOOKOUT OVER GGBF PONDS TO MINIMISE HABITAT DISTURBANCE AND PROVIDE OPPORTUNITY OF VISUAL INTERACTION

GGBF TIERED POND SYSTEM WITH NATURALISTIC WEIRS, HABITAT LOGS, PLACED ROCK AREAS, OPEN WATER AREAS AND PLANTED MARGINS FOR MAXIMUM DIVERSITY AND OPTIMAL HABITAT CONNECTION TO THE EXISTING PONDS.

NEW NATIVE TREE CANOPY AROUND THE PERIMETER OF THE PLAYING FIELDS FOLLOWING THE SHARED PEDESTRIAN AND CYCLIST PATHWAY TO PROVIDE SHADE, AMENITY AND OPPORTUNITIES FOR REST.

SPORTING GRADE TURF TO PLAYING FIELDS.

WELL VEGETATED NATURE-INSPIRED PLAYGROUND COMBINED WITH PROPRIETARY SHADE DEVICES FOR DAY 1 COMFORT AND USE.

LEGEND

- - Project Boundary
- Proposed tree planting/s
- Publicly accessible turf areas
- Landscape revegetation areas
- Riparian / wetland vegetated swale planting
- ▨ Buffer / screen planting areas
- 👁️ Prominent contextual and filtered landscape vistas incorporated into the landscape design

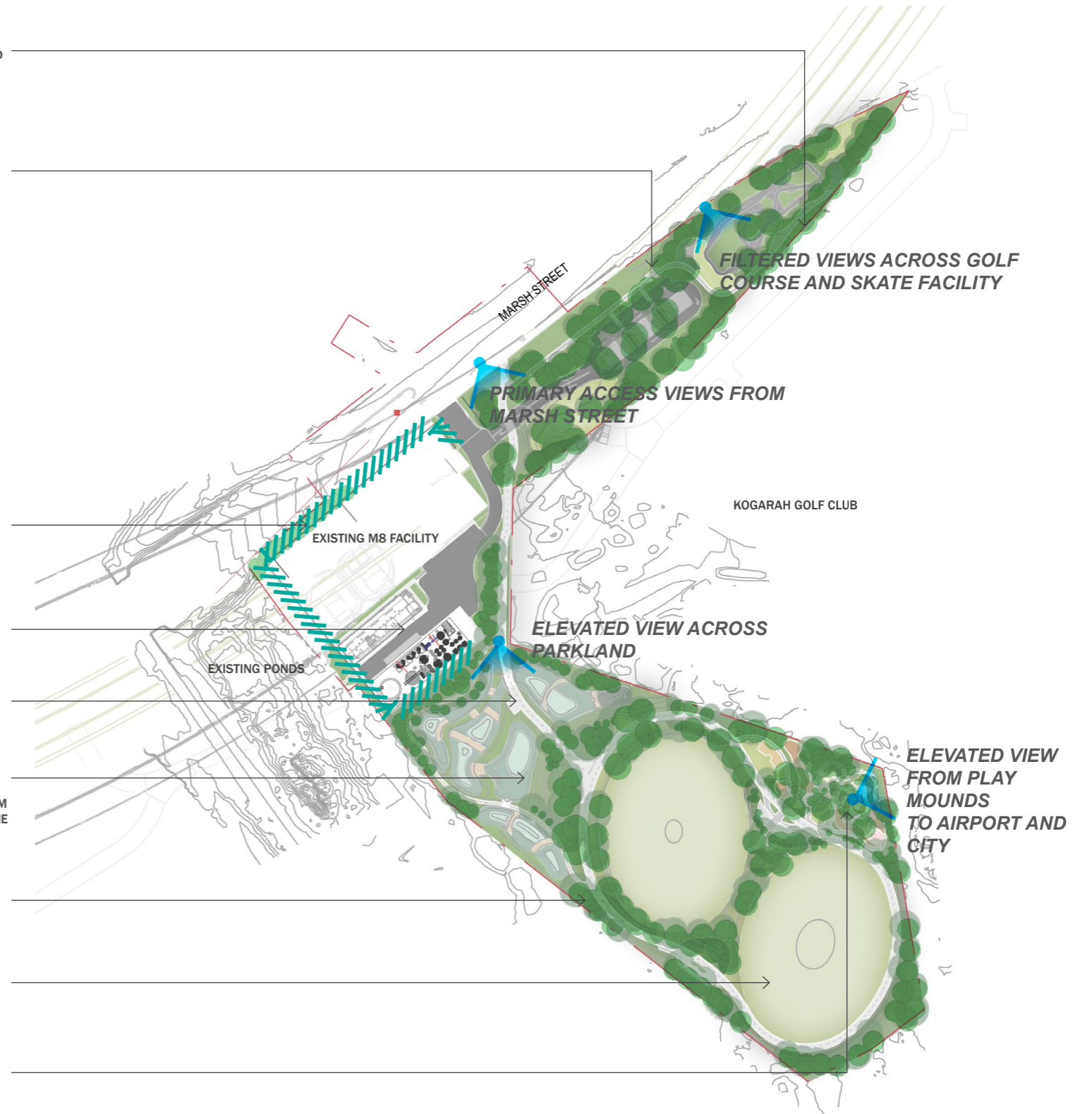


Figure 8-9: Marsh Street Park planting strategy plan



Plant species selection

The following typical planting typologies will be utilised in this area:

- Turf areas
- Water quality / bioretention areas
- Ground layer massed planting and low shrubs
- Bulky shrubs and small trees
- Tree planting.

An outline of the main plant species proposed for this area/s is provided in the following tables.

MOC1 plant species list

Botanical Name	Common Name
TREES	
<i>Angophora costata</i>	Smooth-barked Apple
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Banksia integrifolia</i>	Coastal Banksia
<i>Casuarina cunninghamiana</i>	River She-Oak
<i>Corymbia maculata</i>	Spotted Gum
<i>Eucalyptus robusta</i>	Swamp Mahogany
<i>Hymenosporum flavum</i>	Native Frangipani
SHRUBS	
<i>Acacia redolens</i>	Prostrate Acacia
<i>Acacia suaveolens</i>	Sweet Wattle
<i>Adenanthos sericeus</i>	Woolly Bush
<i>Banksia ericifolia</i>	Heath-leaved Banksia
<i>Banksia spinulosa</i>	Hairpin Banksia
<i>Callistemon citrinus</i>	Crimson Bottlebrush
<i>Correa alba</i>	White Correa
<i>Correa decumbens</i>	Spreading Correa
<i>Correa 'Dusky Bells'</i>	Dusky Bells
<i>Grevillea sericea</i>	Spider-flower Grevillea
<i>Hakea laurina</i>	Pin-cushion Hakea
<i>Kunzea ambigua</i>	Tick Bush
<i>Leptospermum laevigatum</i>	Coast Tea Tree
<i>Melaleuca thymifolia</i>	Honey Myrtle
<i>Rhagodia spinescens</i>	Creeping Salt Bush
<i>Viminaria juncea 'Golden Spray'</i>	Golden Spray
<i>Westringia fruticosa</i>	Coastal Rosemary
GROUNDCOVERS & GRASSES	
<i>Ajuga australis</i>	Australian Bugle
<i>Chrysocephalum semipapposum</i>	Clustered Everlasting
<i>Conostylis candicans</i>	Grey Cotton-head
<i>Dianella caerulea</i>	Blue Flax Lily
<i>Dianella revoluta</i>	Blueberry Lily
<i>Dichondra repens</i>	Kidney-Weed
<i>Hardenbergia violacea</i>	Native Sarsaparilla
<i>Hibbertia fasciculata</i>	Bundled Guinea Flower
<i>Hibbertia scandens</i>	Guinea Flower
<i>Kennedia rubicunda</i>	Dusky Coral Pea
<i>Scaevola 'Purple Fanfare'</i>	Purple Fanfare
<i>Viola hederacea</i>	Native Violet
<i>Ficinia nodosa</i>	Knotted Club-rush



Angophora costata



Angophora floribunda



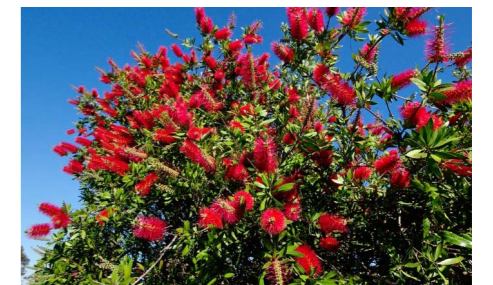
Leptospermum laevigatum



Banksia integrifolia



Banksia ericifolia



Callistemon citrinus



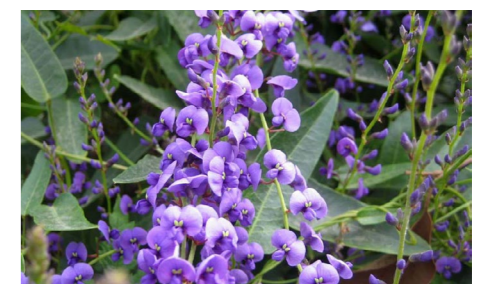
Grevillea sericea



Hibbertia scandens



Dichondra repens



Hardenbergia violacea

Green and Golden Bell Frog Habitat plant species list

Botanical Name	Common Name
TREES	
<i>Acmena smithii</i>	Lilly Pilly
<i>Angophora costata</i>	Sydney Red Gum
<i>Banksia serrata</i>	Old Man Banksia
<i>Elaeocarpus reticulatus</i>	Blueberry Ash
<i>Eucalyptus saligna</i>	Sydney Blue Gum
<i>Lophostemon confertus</i>	Queensland Brushbox
SHRUBS	
<i>Banksia aemula</i>	Wallum Banksia
<i>Banksia ericifolia</i>	Heath-leaved Banksia
<i>Banksia oblongifolia</i>	Fern-leaf Banksia
<i>Callistemon citrinus</i>	Crimson Bottlebrush
<i>Correa alba</i>	White Correa
<i>Dillwynia sericea</i>	Showy Parrot Pea
<i>Dodonaea triquetra</i>	Common Hop Bush
<i>Eriostemon australasius</i>	Pink Wax Flower
<i>Grevillea linearifolia</i>	Linear Leaf Grevillea
<i>Kunzea capitata</i>	Pink Kunzea
<i>Leptospermum laevigatum</i>	Coastal Tea Tree
<i>Leptospermum polygalifolium</i>	Tantoon
<i>Leptospermum trinervium</i>	Paperbark Tea Tree
<i>Persoonia nutans</i>	Nodding Geebung
<i>Ricinocarpos pinifolius</i>	Wedding Bush
<i>Westringia fruticosa</i>	Coastal Rosemary
GROUND COVERS / NATIVE GRASSES	
<i>Hardenbergia violacea</i>	False sarsaparilla
<i>Hibbertia scandens</i>	Snake Vine
<i>Imperata cylindrica</i>	Blood Grass
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Microlaena stipoides</i>	Weeping Grass
<i>Poa labillardierei 'Eskdale'</i>	Tussock Grass
<i>Themeda australis</i>	Kangaroo Grass

Marsh Street Park plant species list

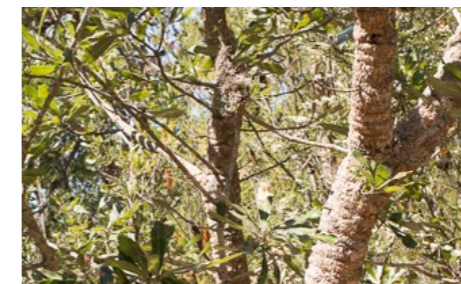
Botanical Name	Common Name
TREES	
<i>Acmena smithii</i>	Lilly Pilly
<i>Angophora costata</i>	Sydney Red Gum
<i>Banksia serrata</i>	Old Man Banksia
<i>Elaeocarpus reticulatus</i>	Blueberry Ash
<i>Eucalyptus saligna</i>	Sydney Blue Gum
<i>Lophostemon confertus</i>	Queensland Brushbox
SHRUBS	
<i>Banksia aemula</i>	Wallum Banksia
<i>Banksia ericifolia</i>	Heath-leaved Banksia
<i>Banksia oblongifolia</i>	Fern-leaf Banksia
<i>Callistemon citrinus</i>	Crimson Bottlebrush
<i>Correa alba</i>	White Correa
<i>Dillwynia sericea</i>	Showy Parrot Pea
<i>Dodonaea triquetra</i>	Common Hop Bush
<i>Eriostemon australasius</i>	Pink Wax Flower
<i>Grevillea linearifolia</i>	Linear Leaf Grevillea
<i>Kunzea capitata</i>	Pink Kunzea
<i>Leptospermum laevigatum</i>	Coastal Tea Tree
<i>Leptospermum polygalifolium</i>	Tantoon
<i>Leptospermum trinervium</i>	Paperbark Tea Tree
<i>Persoonia nutans</i>	Nodding Geebung
<i>Ricinocarpos pinifolius</i>	Wedding Bush
<i>Westringia fruticosa</i>	Coastal Rosemary
GROUND COVERS / NATIVE GRASSES	
<i>Hardenbergia violacea</i>	False sarsaparilla
<i>Hibbertia scandens</i>	Snake Vine
<i>Imperata cylindrica</i>	Blood Grass
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Microlaena stipoides</i>	Weeping Grass
<i>Poa labillardierei 'Eskdale'</i>	Tussock Grass
<i>Themeda australis</i>	Kangaroo Grass



Acmena smithii



Angophora costata



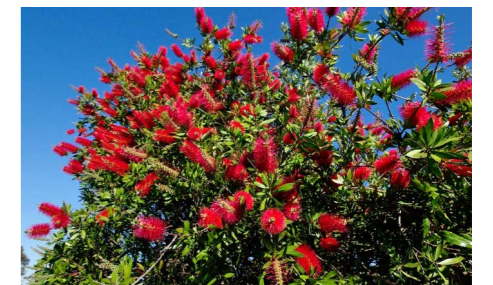
Banksia serrata



Elaeocarpus reticulatus



Banksia aemula



Callistemon citrinus



Grevillea linearifolia



Leptospermum laevigatum



Hardenbergia violacea



Hibbertia scandens

8.8.2 The ATC

The ATC stretches north to south from Bestic Street in Kyeemagh to Chuter Avenue in Monterey. It traverses a variety of landscape conditions from Muddy Creek in the north to Scarborough Park in the south. Planting will respond to the existing character, from turfed recreation space through to rehabilitation planting.

Sydney Water Muddy Creek Naturalisation Works

The ATC directly interfaces with the naturalisation works being undertaken by Sydney Water at Muddy Creek. The landscape design prepared by Sydney Water generally follows the ATC alignment. The landscaping and planting design approach in this area is to seamlessly tie into the designed areas of planting adjacent to the ATC corridor.

Rockdale Bicentennial Park

The ATC intersects with the reinstatement works at Rockdale Bicentennial Park. The planting design approach to the parkland is described in *Section 8.8.3*.

Scarborough Park

The ATC provides an important shared pedestrian and cycle connection from Rockdale Bicentennial Park to Chuter Avenue through the existing wetlands within Scarborough Park (also referred to as Patmore Swamp).

The ATC alignment in this location will be slightly elevated to maintain a minimum 1 in 1 year flood immunity to meet Project requirements. This will result in the implementation of batters at maximum 1 in 4 grade that transitions into the existing reedlands that form the predominant landscape typology in this area.

Planting along this section of the ATC corridor will seek to reinstate any disturbed areas of wetland reeds and sedges. Batters from the ATC path will be planted and trees provided where space permits.

A rehabilitation strategy for the broader extents of Patmore Swamp, which generally lies beyond the project boundary and footprint is provided in later on in this *Section 8.8.4*.



Figure 8-10: Active Transport Corridor - tree canopy strategy

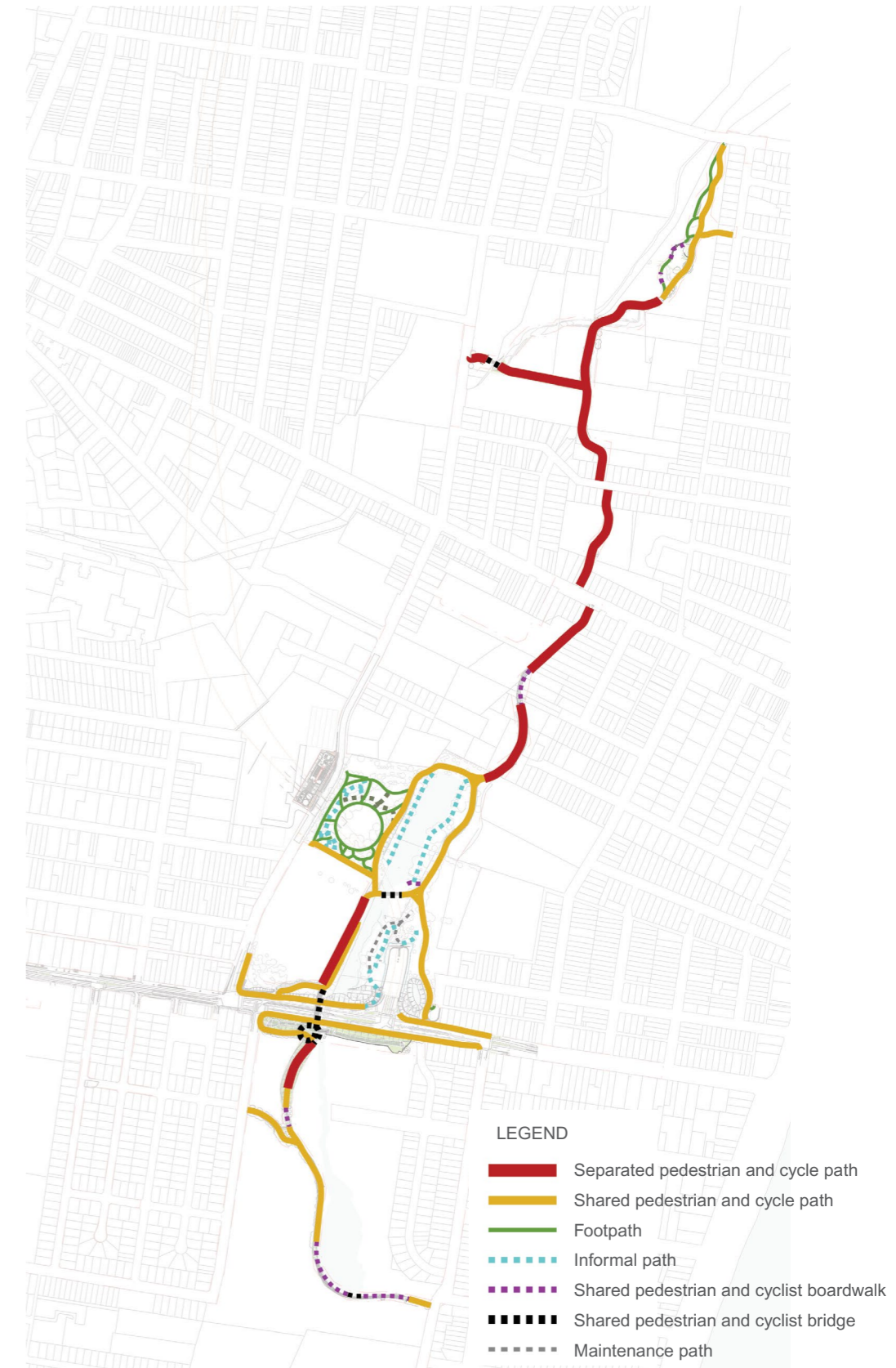


Figure 8-11: Active Transport Corridor - connectivity diagram. Refer *Appendix B* of this UDLP

Typical landscape treatments along the ATC

The ATC comprises of a combination of different path widths as defined by the SWTC set for the Project Works (refer to *Appendix B* for further detail). Pedestrian and cycle path widths have generally been classified under two types:

- Shared user paths; nominally 3 metres wide
- Separated pedestrian and cycle paths; nominally 4.5 metres wide with a 1m wide planted median, where space permits.

Generally, landscape works along this linear corridor will be limited to the extent of disturbance and earthworks profiling to tie into the existing open space condition smoothly.

The landscape design along the corridor aims to reinforce the green infrastructure principles through safe and shade planting. Frangible planting will be provided for the safety of cyclists, while canopy coverage has been maximised for user comfort. A diverse and layered tree canopy will help shade the pathway, while understorey planting will respond to open space and rehabilitation areas.

The adjacent diagrams illustrate the main path arrangements and the guiding landscape principles applied to the entire corridor.

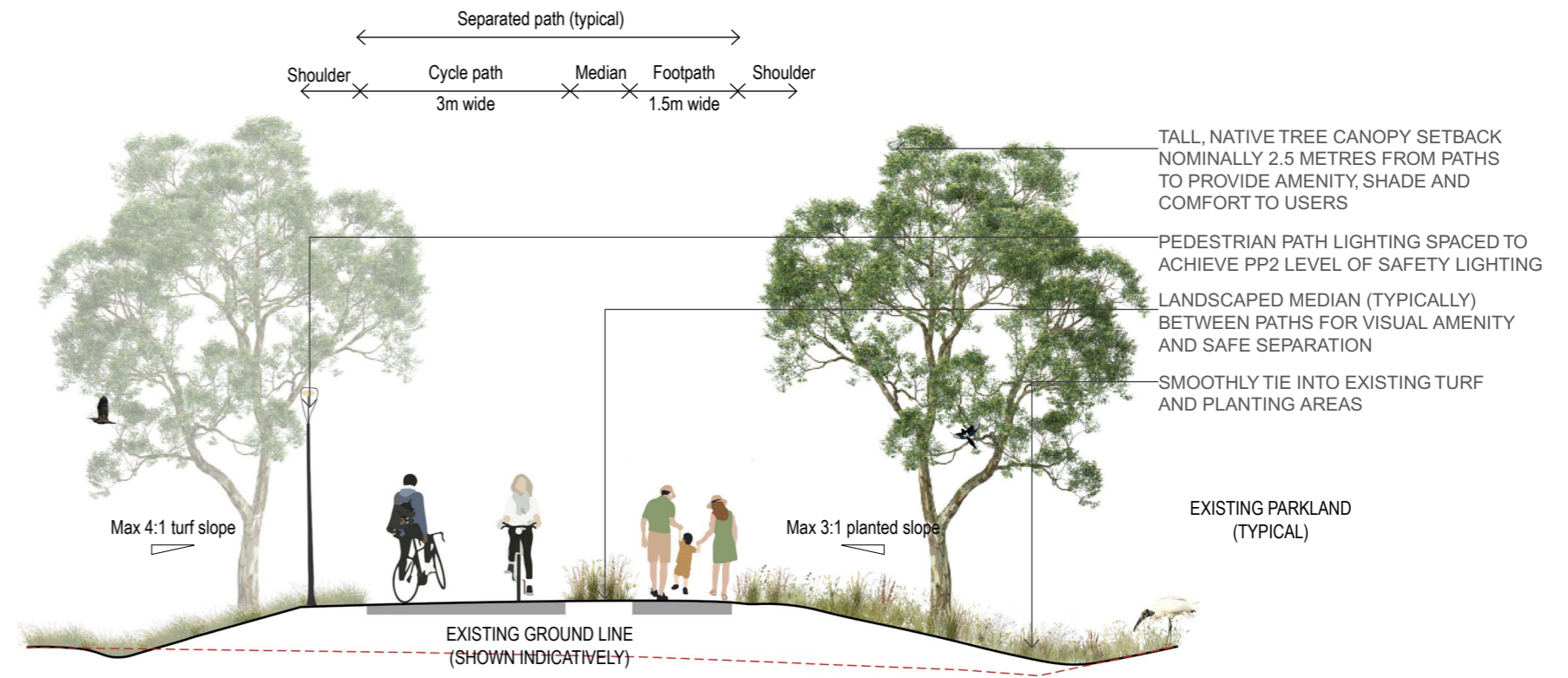


Figure 8-12: Typical section through separated cycle path

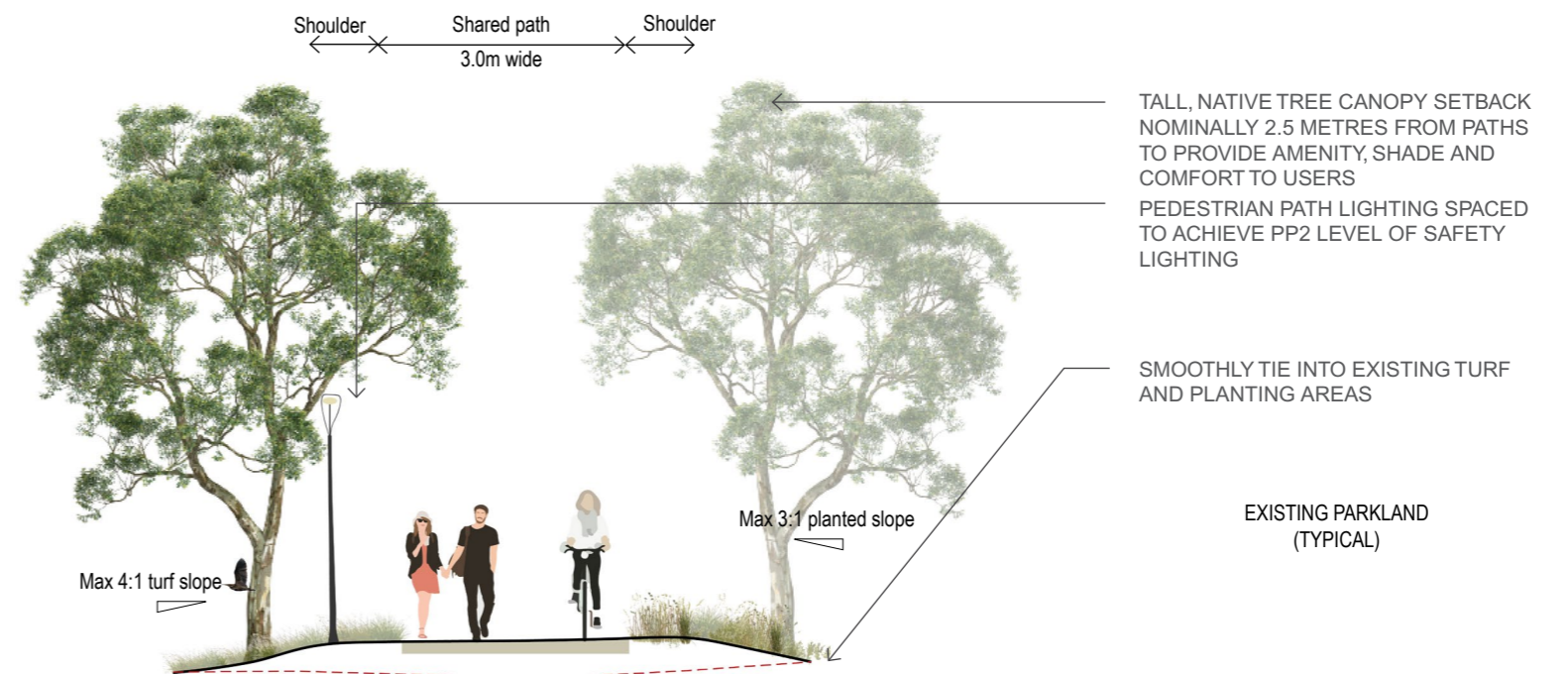


Figure 8-13: Typical section through shared user path

Landscape strategy plan

The following plans highlight the key landscape design approach that has been incorporated into the design along the ATC network.

The plans illustrates the composition of main landscape design elements which typically include:

- Publicly accessible turf areas
- Landscape revegetation areas
- Proposed tree planting locations
- Buffer / screen planting areas
- Prominent contextual and filtered landscape views.

For descriptions of Project elements, refer to concept plans in *Section 4* of this UDLP.

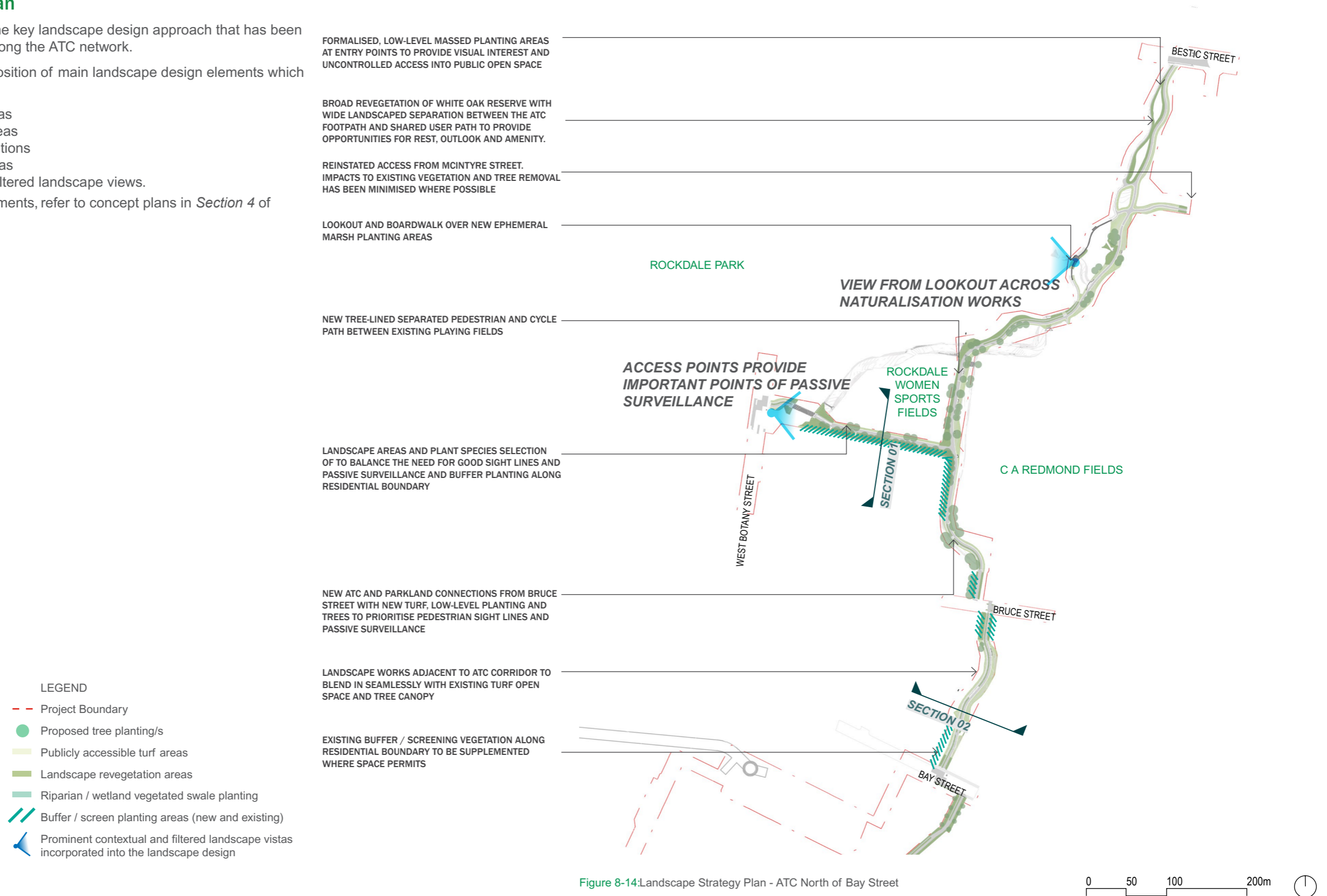


Figure 8-14: Landscape Strategy Plan - ATC North of Bay Street



Figure 8-15: Landscape Strategy Plan - ATC South of President Avenue

Typical sections

Typical sections through the ATC corridor are provided in this section to illustrate the approach to the landscape design.



Key plan

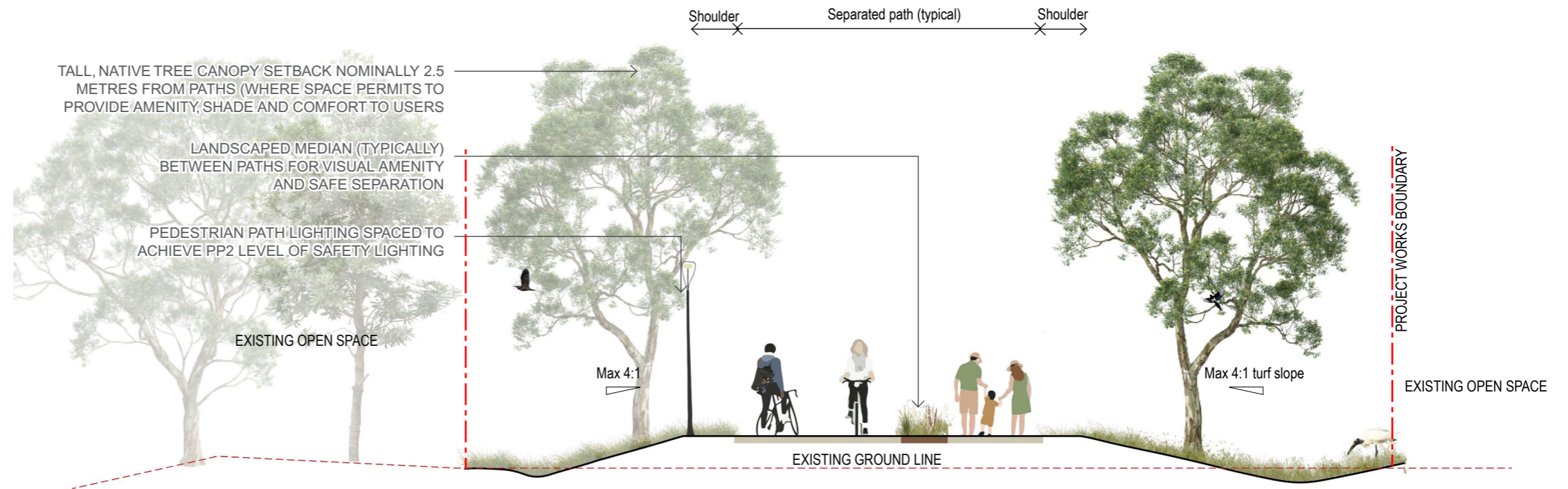
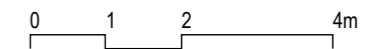
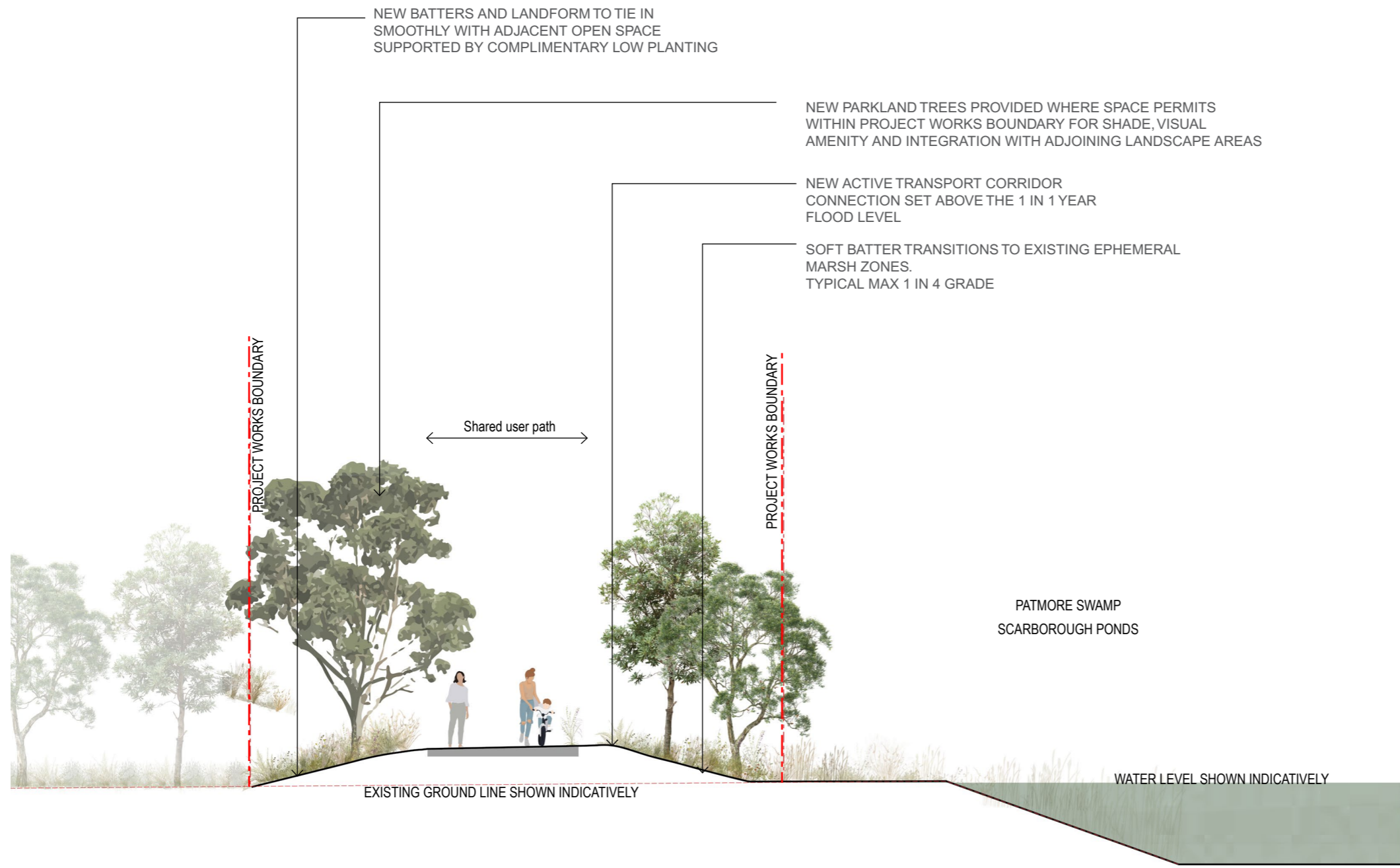


Figure 8-17: Section 02 - Typical section through ATC pedestrian and cycle path. Scale 1:100



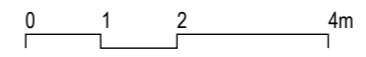
Figure 8-16: Section 01 - Typical section through ATC pedestrian and cyclist path. Scale 1:100





Key plan

Figure 8-18: Section 03 - Typical section through ATC pedestrian and cyclist path in Scarborough Park. Scale 1:100



Plant species selection

The following typical planting typologies will be utilised along the ATC:

- Turf areas
- Water quality / bioretention areas
- Ground layer massed planting and low shrubs
- Bulky shrubs and small trees
- Tree planting.

An outline of the main plant species proposed is provided in the following tables.

ATC plant species list

Botanical Name	Common Name
TREES	
<i>Allocasuarina distyla</i>	Scrub She-Oak
<i>Banksia integrifolia</i>	Coast Banksia
<i>Banksia serrata</i>	Old Man Banksia
<i>Corymbia gummifera</i>	Red Bloodwood
<i>Casuarina glauca</i>	Swamp Oak
<i>Eucalyptus robusta</i>	Swamp Mahogany
<i>Melaleuca linariifolia</i>	Paperbark
<i>Eucalyptus microcorys</i>	Tallowwood
<i>Eucalyptus sclerophylla</i>	Scribbly Gum
SHRUBS	
<i>Banksia aemula</i>	Wallum Banksia
<i>Banksia ericifolia</i>	Heath-leaved Banksia
<i>Banksia oblongifolia</i>	Fern-leaf Banksia
<i>Callistemon citrinus</i>	Crimson Bottlebrush
<i>Correa alba</i>	White Correa
<i>Dillwynia sericea</i>	Showy Parrot Pea
<i>Dodonaea triquetra</i>	Common Hop Bush
<i>Eriostemon australasius</i>	Pink Wax Flower
<i>Grevillea linearifolia</i>	Linear Leaf Grevillea
<i>Kunzea capitata</i>	Pink Kunzea
<i>Leptospermum laevigatum</i>	Coastal Tea Tree
<i>Leptospermum polygalifolium</i>	Tantoon
<i>Leptospermum trinervium</i>	Paperbark Tea Tree
<i>Persoonia nutans</i>	Nodding Geebung
<i>Ricinocarpus pinifolius</i>	Wedding Bush
<i>Westringia fruticosa</i>	Coastal Rosemary
GROUND COVERS / NATIVE GRASSES	
<i>Hardenbergia violacea</i>	False sarsaparilla
<i>Hibbertia scandens</i>	Snake Vine
<i>Imperata cylindrica</i>	Blood Grass
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Microlaena stipoides</i>	Weeping Grass
<i>Poa labillardierei</i> 'Eskdale'	Tussock Grass
<i>Themeda australis</i>	Kangaroo Grass



Allocasuarina distyla



Banksia integrifolia



Corymbia gummifera



Casuarina glauca



Melaleuca linariifolia



Eucalyptus microcorys



Persoonia nutans



Leptospermum laevigatum



Lomandra longifolia



Poa labillardierei 'Eskdale'



Artist's Impression: Pedestrian view along ATC near Muddy Creek and C A Redmond Field (trees and landscaping shown at maturity).

8.8.3 Rockdale Bicentennial Park

At Rockdale Bicentennial Park, the primary objective has been to create a cohesive, integrated park that is centred around the existing wetland and bushland character of the Bicentennial Park Ponds. Critical to achieving this is the removal of existing barriers within the parkland and the implementation of the native bushland character drawn from the number of remnant endangered ecological communities (EECs) present on site.

Existing areas of bushland will be rehabilitated where they have been disturbed, through weed-eradication, soil improvement and rehabilitation planting. This rehabilitation will help to restore water quality, food, forage and shelter for fauna, and human enjoyment.

A broad tree canopy has been designed for the parkland to be diverse in species and density, reinstating more trees than has been removed as a result of constructing the project. A varied understorey of native ground covers and shrub will enhance habitat for smaller bird species, invertebrates and insects.

Visual access to water has been a fundamental consideration in the parkland design. A number of wetland terraces with seating walls have been designed to enhance water quality and will be softened with plantings of sedges, reeds and native grasses. Timber seating platforms have been located at key vantage points to rest, and enjoy.

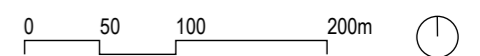
Nature gardens and cultural plantings

The design team has collaborating with JIWAH as part of a co-design process to develop a landscape design response that is sensitive to place and respectful in acknowledging and celebrating Country through planting design.

A holistic approach to planting has been adopted across the parkland to draw upon and celebrate native vegetation communities. Specific 'interest' areas of the park have been designated at key nodes or prominent locations where indigenous planting will be highlighted through bush gardens along a cultural circuit and a nature garden located near the amenities pavilion.



Figure 8-19: Rockdale Bicentennial Park precinct plan. Scale 1:5000



8.8.3.1 Landscape design strategies

Landscape typologies

Landscape planting within Bicentennial Park is composed of distinct typologies as shown below. Each typology has been developed to respond to the modified site conditions and has been influenced by the following criteria:

- Proposed vegetation typologies relating to the pre-European geology and vegetation of the site and surrounding coast areas which include coastal heathlands and freshwater swamps.
- Local character species established within Environmental Exclusion Zone which include the Coastal Flats Swamp Mahogany Forest vegetation community.
- Proven performance for manufactured site topography, microclimate, soil makeup/s and existing site soil conditions
- Suitability within public parklands and managed motorway environments.
- Compatibility with wetland systems and ephemeral marsh zones.

The landscape typologies draw upon the characteristics and species profiles of plant communities that once occupied the site and surrounding region.



Figure 8-20: Landscape typologies diagram

Planting arrangement / Open space structure

The arrangement of planting and turf areas has been developed to support the variety of uses across the park which range from open playing fields, community lawn, playgrounds, discovery trails, nature and bush gardens and broad revegetation areas. The diagram below illustrates how the planting structure has been applied to reinforce the intended use in each zone in terms of the overall spatial and planting structure (height, density, amenity).



Figure 8-21: Open space structure

Tree canopy

The arrangement of the tree canopy will inform the character and structure of vegetation and open space that surrounds it. A diverse tree canopy has been developed to support the open space structure based on the native vegetation communities list above. The general tree planting species include:

- *Angophora costata*
- *Banksia integrifolia*
- *Casuarina cunninghamiana*
- *Corymbia ficifolia*
- *Corymbia gummifera*
- *Cupaniopsis anacardioides*
- *Eucalyptus robusta*
- *Glochidion ferdinandi*
- *Melaleuca ericifolia*
- *Melaleuca linariifolia*
- *Melaleuca quinquenervia*
- *Melaleuca styphelioides*.



Figure 8-22: Tree canopy diagram

Terraced wetlands

The terraced wetland will be a focal point in the centre of the parkland adjacent to the shared pedestrian and cyclist bridge over the Bicentennial Park Ponds. The terraces have been designed as a series of weirs to enable water from the existing wetlands to be recirculated and improve the water quality by filtering high levels of nutrients in the water through a series of shallow macrophyte wetlands that will densely planted native sedges and reeds. The key landscape design principles adopted are:

- The water recirculation will have an approximate 25-day residence time in the pond to deprive nuisance algae of light for growth
- A range of aquatic and ephemeral vegetation zones / benches at various levels will be created, including:
 - Ephemeral zone; 100-300mm above Normal Water Level (NWL), this zone will include trees
 - Shallow marsh; 0-150mm below NWL, including smaller herbaceous species
 - Deep marsh; 150-350mm below NWL, including tall herbaceous species
 - Submerged marsh; 350mm+, including submerged herbaceous species.
- All approach batters to wetland edges have been designed to align with best practice safety guidelines which include maximum 1 in 5 slope terrestrial batters and 1 in 8 slope safety benches.

A list of wetland plant species has been provided further on in this section.



Figure 8-23: Bicentennial Park - Water quality strategy

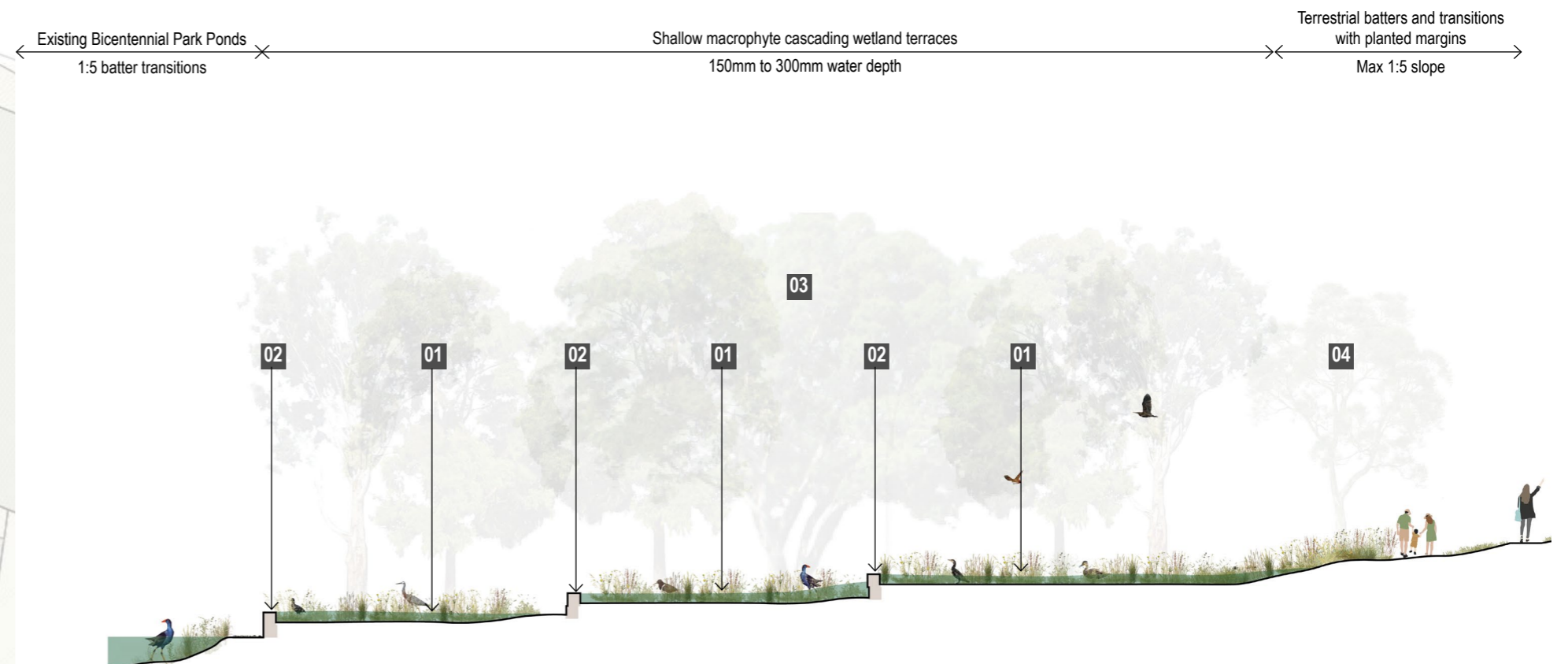


Figure 8-24: Typical section through terraced wetlands

Key

- 01** Submerged reeds and sedges to draw out nutrients and improve water quality
- 02** Sandstone block terraces walls to support cascading wetlands before treated water re-enters the existing wetland
- 03** Amenities trees along wetland margins
- 04** Coastal Swamp Oak Forest behind (shown indicatively)



Artist's Impression: view over terraced wetlands at Rockdale Bicentennial Park (trees and landscaping shown at maturity).

Cultural landscape design approach

A holistic approach to native planting has been adopted across the parklands to draw upon, celebrate and restore native vegetation communities. As a key Connecting with Country principle, the notion of 'Aboriginal led' has been a focus for the planting design as part of a collaborative co-design process. The design team has collaborated with JIWAH to develop an over-arching approach to planting design at Rockdale Bicentennial Park that prioritises natural systems to include people, animals, resources and plants equally.

With that in mind, a series of bush trails and gardens have been linked along a cultural circuit to create moments to pause within the broader native landscape and engage with Country for reflection and delight. It will create gardens of vitality, diversity, colour and seasonal variation, by building a parkland where people, animals and the environment come together.

The bush gardens have been located around the wetland with the intent to listen to the land, listen to and embrace a First Peoples perspective and knowledge, and creates a stage to amplify and celebrate cultural ideas, including opportunities for outdoor education or ceremony.

The cultural circuit provides key learning spaces which aims to engender stewardship through an Indigenous community approach in collaboration with the Indigenous design team.

A list of preferred plant species for these areas is provided further on and is subject to change depending on availability and procurement through the Indigenous landscape contractor team.

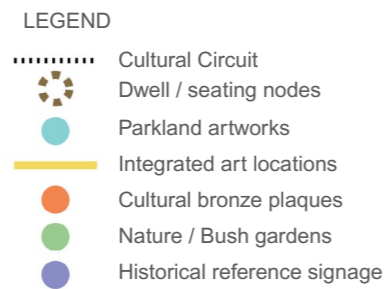


Figure 8-25: Bicentennial Park - cultural circuit diagram (refer Section 7.3)



Animal Attracting Natives



Cultural Workshop Opportunities



Bush Food



Artist's Impression: Bush Garden and seating platforms to the north of Bicentennial Park Ponds (trees and landscaping shown at maturity).

Landscape strategy plan

In conjunction with landscape strategies, the following plan highlights the key landscape design approach that has been incorporated into the design.

The plan illustrates the composition of main landscape design elements which typically include:

- Publicly accessible turf areas
- Landscape revegetation areas
- Proposed tree planting locations
- Buffer / screen planting areas
- Prominent contextual and filtered landscape views.

For descriptions of Project elements, refer to concept plans in *Section 4* of this UDLP.



Figure 8-26: Rockdale Bicentennial Park Planting Strategy

Plant species selection

The following typical planting typologies will be utilised at Rockdale Bicentennial Park:

- Turf areas
- Water quality / bioretention areas
- Ground layer massed planting and low shrubs
- Bulky shrubs and small trees
- Tree planting
- Cultural planting areas.

An outline of the main plant species proposed for Rockdale Bicentennial Park is provided in the following tables.

Rockdale Bicentennial Parkland plant species palette

Botanical Name	Common Name
TREES	
<i>Allocasuarina distyla</i>	Scrub She-Oak
<i>Banksia integrifolia</i>	Coast Banksia
<i>Banksia serrata</i>	Old Man Banksia
<i>Casuarina glauca</i>	Swamp Oak
<i>Corymbia gummifera</i>	Red Bloodwood
<i>Elaeocarpus reticulatus</i>	Blueberry Ash
<i>Eucalyptus robusta</i>	Swamp Mahogany
<i>Glochidion ferdinandi</i>	Cheese Tree
<i>Melaleuca linariifolia</i>	Paperbark
<i>Melaleuca styphelioides</i>	Prickly-leaved Paperbark
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark
UNDERSTOREY/SHRUBS	
<i>Acacia longifolia</i>	Sydney Golden Wattle
<i>Acacia longifolia var sophorae</i>	Sydney Golden Wattle
<i>Acacia suaveolens</i>	Sweet Wattle
<i>Acacia terminalis</i>	Sunshine Wattle
<i>Acacia ulicifolia</i>	Prickly Moses
<i>Banksia aemula</i>	Wallum Banksia
<i>Banksia ericifolia</i>	Heath leaved Banksia
<i>Bauera rubioides</i>	Dog Rose
<i>Banksia integrifolia</i>	Coastal Banksia
<i>Boronia parviflora</i>	Swamp Boronia
<i>Bossiaea heterophylla</i>	Variable Bossiaea
<i>Bossiaea scolopendria</i>	Plank Plant
<i>Correa alba</i>	White Correa
<i>Darwinia fascicularis</i>	Clustered Darwinia
<i>Dillwynia retorta</i>	Small Leaf Parrot Pea
<i>Dodonaea triquetra</i>	Common Hop bush
<i>Epacris longiflora</i>	Fuchsia Heath
<i>Epacris microphylla</i>	Coral Heath
<i>Epacris obtusifolia</i>	Blunt-leaf Heath
<i>Eriostemon australasius</i>	Pink Wax Flower
<i>Hakea teretifolia</i>	Dagger Hakea
<i>Kunzea ambigua</i>	Tick Bush
<i>Lambertia formosa</i>	Mountain Devil
<i>Leptospermum laevigatum</i>	Coastal Tea-tree
<i>Leptospermum trinervium</i>	Flaky-barked Tea Tree
<i>Melaleuca nodosa</i>	Grey Honey Myrtle
<i>Melaleuca squamea</i>	Swamp Honey Myrtle

Rockdale Bicentennial Parkland plant species palette

Botanical Name	Common Name
<i>Monotoca scoparia</i>	Prickly Broom Heath
<i>Persoonia lanceolata</i>	Lance-leaf Geebung
<i>Pittosporum undulatum</i>	Sweet Pittosporum
<i>Ricinocarpos pinifolius</i>	Wedding Bush
GROUND LAYER	
<i>Actinotus helianthi</i>	Flannel Flower
<i>Actinotus minor</i>	Flannel Flower
<i>Astroloma pinifolium</i>	Pine Heath
<i>Baeckea imbricata</i>	Spindly Baeckea
<i>Blechnum camfieldii</i>	Eared Swamp fern
<i>Billardiera scandens</i>	Apple Berry
<i>Caustis pentandra</i>	Thick Twist Rush
<i>Conospermum taxifolium</i>	Variable Smokebush
<i>Cyathochaeta diandra</i>	Sheath Rush
<i>Dianella revoluta</i>	Flax lily
<i>Dichelachne crinita</i>	Longhair Plume-grass
<i>Eleocharis spp.</i>	Spike Rush
<i>Entolasia marginata</i>	Bordered Panic
<i>Eragrostis brownii</i>	Brown's Love Grass
<i>Gahnia clarkei</i>	Tall Saw-sedge
<i>Hardenbergia violacea</i>	False Sarsaparilla
<i>Hibbertia fasciculata</i>	Golden Guinea Vine
<i>Hydrocotyle peduncularis</i>	Water Pennywort
<i>Hypolepis muelleri</i>	Harsh Ground Fern
<i>Lepidosperma laterale</i>	Variable Sword-sedge
<i>Leucopogon ericoides</i>	Pink Beard Heath
<i>Lomandra longifolia</i>	Spiny-Headed Mat Rush
<i>Pimelea linifolia</i>	Slender Rice Flower
<i>Pteridium esculentum</i>	Bracken Fern
<i>Viola hederacea</i>	Native Violet
<i>Xanthorrhoea resinifera</i>	Grass Tree



Acacia longifolia



Allocasuarina distyla



Acacia suaveolens



Actinotus helianthi



Astroloma pinifolium



Baeckea imbricata



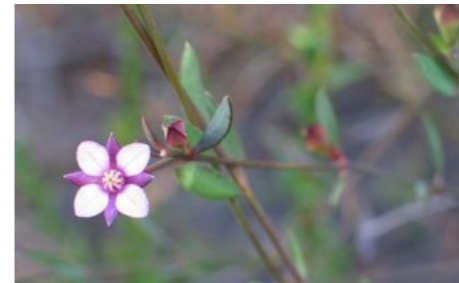
Banksia aemula



Banksia integrifolia



Blechnum camfieldii



Boronia parviflora



Bossiaea heterophylla



Dichelachne crinita



Dodonaea triquetra



Elaeocarpus reticulatus



Entolasia marginata



Eucalyptus robusta



Gahnia clarkei



Glochidion ferdinandi



Hypolepis muelleri



Leptospermum laevigatum



Melaleuca linearifolia



Melaleuca styphelloides



Melaleuca quinquenervia



Pteridium esculentum



Viola hederacea

Cultural planting species list

Botanical Name	Common Name
TREES	
<i>Acacia longifolia</i>	Sydney Golden Wattle
<i>Podocarpus spinulosus</i>	Dwarf Plum Pine
<i>Citrus australasica</i>	Finger Lime
<i>Citrus garrawayi</i>	Thornless fingerlime
<i>Ficus coronata</i>	Sandpaper Fig
<i>Macadamia integrifolia</i>	Macadamia
<i>Banksia integrifolia</i>	Coastal Banksia

Cultural planting species list

Botanical Name	Common Name
UNDERSTOREY/SHRUBS	
<i>Austromyrtus tenuifolia</i>	Midyim Berry
<i>Baeckea imbricata</i>	Spindly Baeckea
<i>Leptospermum petersonii</i>	Lemon tea tree
<i>Melaleuca hypericifolia</i>	Hillock bush
<i>Mentha australis</i>	River Mint
<i>Pimelea linifolia subsp. linifolia</i>	Slender Rice-Flower
<i>Prostanthera rotundifolia</i>	Round-leaved Mintbush

Cultural planting species list

Botanical Name

GROUND LAYER

Actinotus helianthi
Actinotus minor
Antidesma erostre
Arthropodium strictum
Billardiera scandens
Brachyscome multifida
Bulbine bulbosa
Chrysocephalum apiculatum
Cissus antarctica
Crinum pedunculatum
Dendrobium speciosum
Dianella caerulea
Dianella revoluta
Dichondra repens
Ficinia nodosa
Hardenbergia violacea
Linum marginale
Lomandra longifolia
Microseris lanceolata
Patersonia glabrata
Pycnosorus globosus
Scaevola calendulacea
Smilax glyciphylla
Stylidium graminifolium
Themeda australis
Thysanotus tuberosus
Trachymene incisa
Viola hederacea

Common Name

Flannel Flower
 Lesser Flannel Flower
 Wild Currant
 Chocolate Lily
 Apple Berry
 Cut-leaved Daisy
 Bulbine Lily
 Everlastings
 Kangaroo Vine
 Swamp Lily
 Sydney Rock Orchid
 Flax-lily
 Flax lily
 Dichondra
 Knobby Headed Club Rush
 False Sarsaparilla
 Native Flax
 Spiny-headed Mat-rush
 Yam Daisy
 Purple Flag
 Billy Buttons
 Dune Fan Flower
 Sweet Sarsaparilla
 Trigger Plant
 Kangaroo Grass
 Fringe Lily
 Wild Parsnip
 Native Violet



Ficus coronata



Macadamia integrifolia



Corymbia ficifolia 'Summer Beauty'



Banksia integrifolia



Syzygium australe



Tetragonia tetragonioides



Acacia longifolia



Actinotus helianthi



Brachyscome multifida



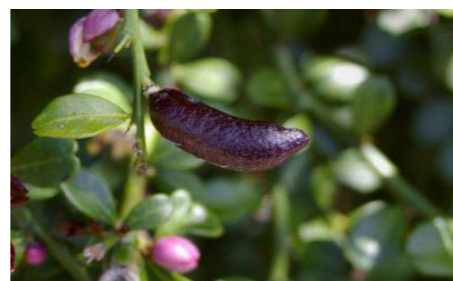
Austromyrtus dulcis



Banksia 'Birthday Candles'



Epacris longiflora



Citrus australasica



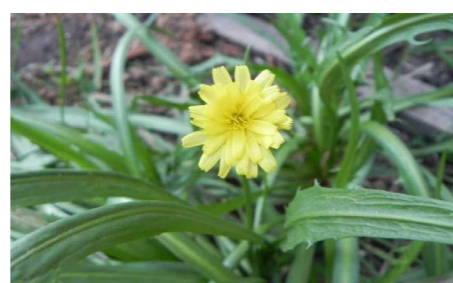
Podocarpus spinulosus



Ozothamnus diosmifolius 'Coral Flush'



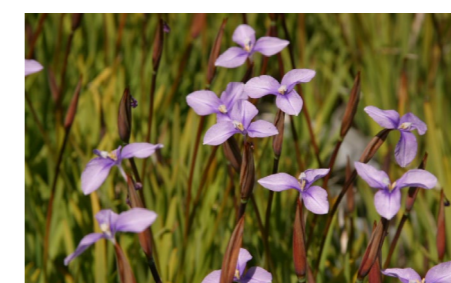
Chrysocephalum apiculatum



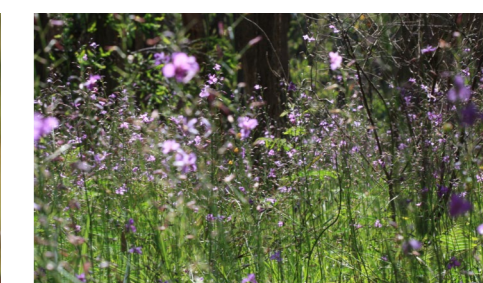
Microseris lanceolata



Themeda triandra



Patersonia glabrata



Arthropodium strictum

Water Quality and Wetland areas

Botanical Name	Common Name
<i>Allocasuarina littoralis</i>	Black She-oak
<i>Alisma plantago-aquatica</i>	Common Water-plantain
<i>Banksia integrifolia</i>	Coastal Banksia
<i>Baumea articulata</i>	Jointed Rush
<i>Baumea juncea</i>	Bare Twig Rush
<i>Bolboschoenus fluviatilis</i>	River Bulrush
<i>Casuarina glauca</i>	Swamp she-oak
<i>Carex exaltatus</i>	Giant Sedge
<i>Chorizandra cymbaria</i>	Heron bristle rush
<i>Crinum pedunculatum</i>	Swamp Lily
<i>Eleocharis sphacelata</i>	Tall Spike Rush
<i>Eleocharis acuta</i>	Common spike-rush
<i>Ficinia nodosa</i>	Knobby Club Rush
<i>Juncus usitatus</i>	Common Rush
<i>Lepidosperma laterale</i>	Sword-sedge
<i>Lepidosperma neesii</i>	Stiff Rapier Sedge
<i>Lepironia articulata</i>	Grey Sedge
<i>Leptocarpus tenax</i>	Slender Twine-rush
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark
<i>Melaleuca ericifolia</i>	Swamp Paperbark
<i>Melaleuca linariifolia</i>	Snow-in-Summer
<i>Persicaria strigosa</i>	Prickly Smartweed
<i>Phragmites australis</i>	Common Reed
<i>Potamogeton tricarinatus</i>	Floating Pondweed
<i>Schoenoplectus mucronatus</i>	Bog Bulrush
<i>Schoenoplectus validus</i>	River Club Rush
<i>Triglochin procerum</i>	Water-Ribbons
<i>Villarsia exaltata</i>	Erect Marsh Flower
<i>Xyris ustulata</i>	Yellow Flag



Melaleuca quinquenervia



Eleocharis sphacelata



Baumea articulata



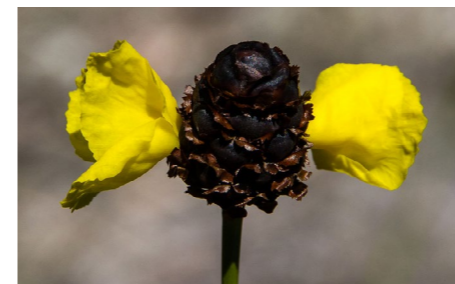
Melaleuca linariifolia



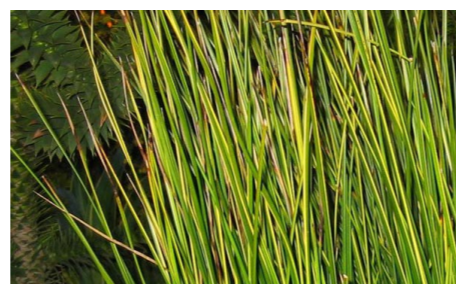
Carex appressa



Ficinia nodosa



Xyris ustulata



Baumea juncea



Crinum pedunculatum

8.8.4 Rehabilitation of Patmore Swamp in Scarborough Park

The aim of this strategy is to fulfil the objective of MCoA E58 which requires rehabilitation of an area at least twice that of the Project construction footprint to be rehabilitated in the area defined as Patmore Swamp, south of President Avenue.

Patmore Swamp (I202) is listed as a local heritage item under the Rockdale LEP. It is technically significant for its contribution to the Central Scarborough wetland area which is an integral part of the wetlands corridor that drains into the Georges River.

The wetlands are situated directly downstream of President Avenue and located within the Scarborough Park North Wetland, which receives water which has spilled over the Bicentennial Park weir. The wetland extends south for around 2 kilometres before entering a storm water culvert.

Under the State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP), the wetlands within Rockdale Bicentennial Park and Scarborough Park North, as well as other wetlands within the vicinity of the project, as “coastal wetlands”.

A biodiversity assessment was undertaken in Chapter 12 of the EIS and identified that the existing channel is extremely shallow with a thick sediment deposition. A dense reedland of *Typha orientalis* (Typha) and *Phragmites australis* (Common Reed) extends westward of the channel, whilst the eastern bank supports scattered *Casuarina glauca* (She Oak) trees. The adjacent plans provided in Figure 8-27 have been extracted from the EIS to illustrate the distribution of existing vegetation communities.

The existing water body itself also suffers from low dissolved oxygen concentrations which is unlikely to support fish life. Salinity is known to be high indicating saline input from ground water as there is minimal tidal influence. The southern portion of the wetland (from around 800 metres south of President Avenue) is mapped as Key Fish Habitat by DPI Fisheries.

The Project team has calculated that the construction footprint within this area of EIS Project Works boundary is approximately 2.5 hectares. To meet the MCoA E58, the area required to be rehabilitated has been doubled to approximately 5 hectares.

As a result, a holistic planting strategy has been prepared for the entire area of Patmore Swamp. At the end of construction, a team of bush regeneration specialists will work in consultation with Council to rehabilitate the designated area. The final extent of the works shall be undertaken based on the area impacted by the construction of the project. The final planting arrangement will be undertaken through an observational approach to removing weeds/undesirable species and with careful consideration of the topography and ground conditions.

Planting design approach

The rehabilitation strategy seeks to reinstate plant species and diversity that is commonly found in vegetation communities for coastal / estuarine wetlands in this part of Sydney, which are characterised by tall dense swards reeds and salt marsh that are tolerant brackish water conditions with fluctuating levels of salinity.

These broad, low-lying areas are prone to inundation and have sparse tree canopy coverage mainly comprising of salt tolerant species such as *Casuarina glauca* (She-oak).

The ATC forms a narrow section of this rehabilitation. It will be slightly elevated above the 1 in 1 year flood level and will utilise plant species that are tolerant to more ephemeral and drier growing conditions, with a focus on increasing tree canopy coverage for shade where space permits with the added benefit of providing filtered views across the broad open swamp.

The areas identified for rehabilitation generally follow the extent of the existing reedlands and prioritise the retention of existing passive amenity turf areas as part of the existing publicly accessible open space.

It is anticipated that all rehabilitation planting will be undertaken as infill planting without the use of heavy machinery. Weed-eradication and debris removal would be undertaken by hand to minimise impacts and disturbance to the existing environment. The rehabilitation works may need to be staged to enable progressive restoration of individual zones and property allotments.

Vegetation mapping undertaken for the EIS identified that majority of the area comprised of established native vegetation communities as shown in the figure below. The planting design approach has sought to target the rehabilitation of areas with higher prevalence of weed and exotic species.

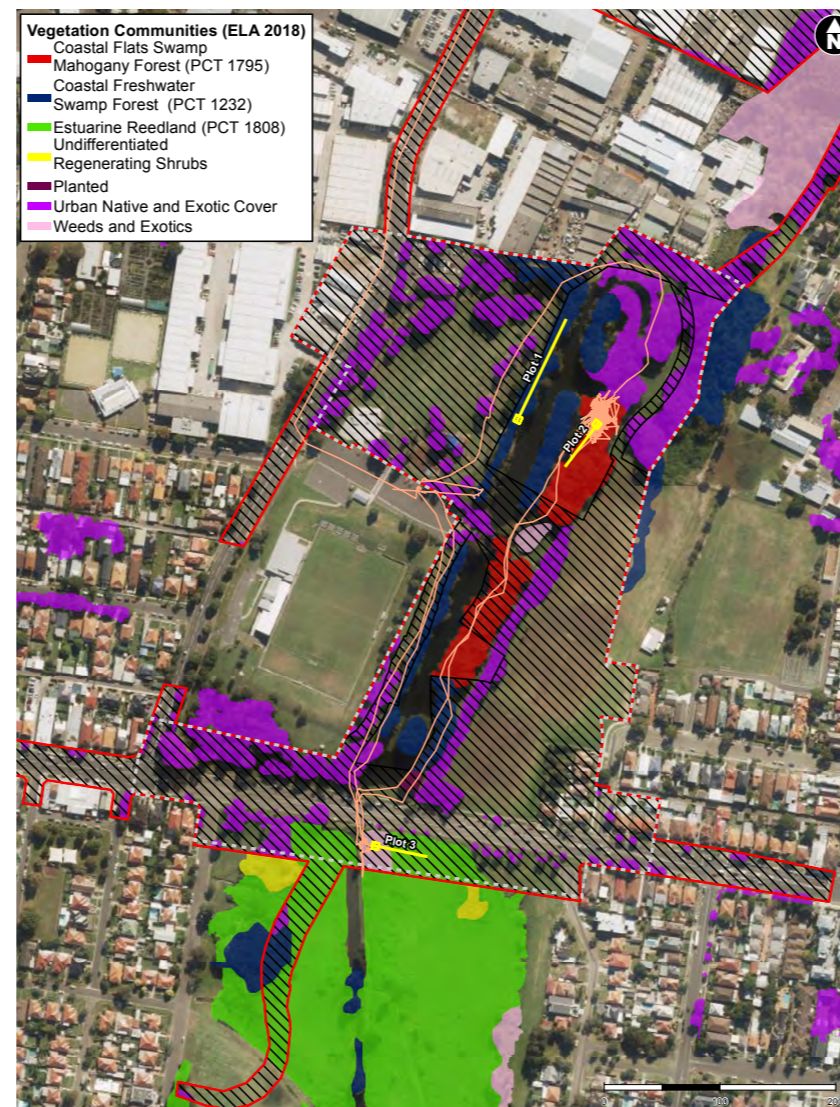


Figure 8-27: Native vegetation mapping in the Project Area - Source: M6 Stage One Preferred Infrastructure Report

Landscape rehabilitation strategy

The proposed landscape strategy is principally derived from plant species that belong to similar estuarine reedlands and woodlands found in Coastal Sydney. There are a range of existing habitats that are evident in the area which include:

- Permanently inundated open water edges
- Regularly inundated reed and marsh land
- Dry or occasionally inundated woodland.

A series of planting typologies have been developed to respond to the various site conditions that would influence the native species distribution between areas that are either dry or occasionally inundated, regularly inundated and permanently wet. The main planting typologies are listed below;

Permanently inundated open water edges

This habitat tends to have two major conditions on site. The eastern shore and north-west shore tend to be well vegetated with *Phragmites australis*. These areas don't require any rehabilitation other than weed eradication.

The south-eastern shore has areas of edge zone with low aquatic macrophyte biodiversity. The areas could be rehabilitated with edge species that would not interrupt view-lines over the open water.

Regularly inundated reed and marsh land

This habitat is current well established vegetation largely dominated by *Phragmites australis* and *Typha sp.* This habitat constitutes at least 2/3 of the proposed off-set area. Most of this habitat doesn't require rehabilitation other than weed eradication. There are small areas where biodiversity could be increased by planting of alternative species of tall emergent macrophytes that can potentially co-exist with *Typha* and *Phragmites*.

Dry or occasionally inundated woodland or forest

A matrix of relatively small to medium patches of this habitat are available for rehabilitation. Recreational land uses may need to be reconciled before the final design.

Figure 8-28 illustrates the potential arrangement of the planting typologies which include works beyond the site boundary that could be undertaken by others in the future.

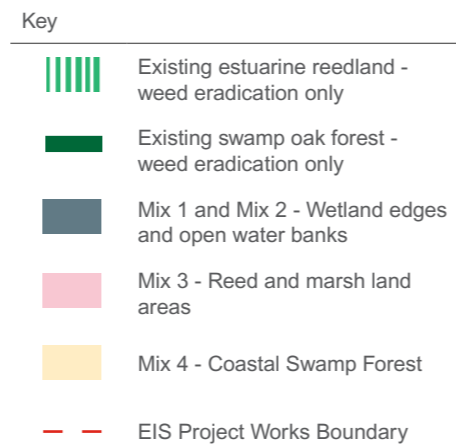


Figure 8-28: Rehabilitation strategy for Patmore Swamp

Plant species selection

An outline of the main plant species proposed for each planting typology is provided in the following tables based on the following main planting mix types:

- Mix 1 (200mm above and below normal water level)
- Mix 2 (mid to upper wetland banks)
- Mix 3 (alternative reed and marsh land)
- Mix 4 (Dry or occasionally inundated woodland).

Plant species have been selected to preference species that are endemic or common to estuarine reed lands generally found in the Sydney area.

The plant list is subject to review during the bush regeneration exercise on site.

Patmore Swamp Rehabilitation Strategy plant species list

Botanical Name	Common Name
Mix 1 (200mm above and below normal water level)	
<i>Baumea juncea</i>	Bare Twig rush
<i>Eleocharis acuta</i>	Common Spikerush
<i>Juncus kraussii</i>	Salt Marsh Rush
<i>Potamogeton tricarlinatus</i>	Floating Pondweed
<i>Triglochin procerum</i>	Water Ribbons
Mix 2 (mid to upper bank)	
<i>Carex appressa</i>	Tall Sedge
<i>Ficinia nodosa</i>	Knobby Club Rush
<i>Lepidosperma laterale</i>	Variable Sword-sedge
<i>Imperata cylindrica</i>	Blady Grass
<i>Spinifex sericeus</i>	Coastal Spinifex
Mix 3 (alternative reed and marsh land)	
<i>Baumea articulata</i>	Jointed Twig-rush
<i>Bolboschoenus fluviatilis</i>	River Bulrush
<i>Schoenoplectus mucronatus</i>	Bog Bulrush
<i>Schoenoplectus validus</i>	Softstem Bulrush
Mix 4 (Dry or occasionally inundated woodland)	
Canopy	
<i>Banksia integrifolia</i>	Coastal Banksia
<i>Corymbia gummifera</i>	Red Bloodwood
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark
<i>Casuarina glauca</i>	Swamp She-Oak
Understorey	
<i>Acacia elongata</i>	Swamp Wattle
<i>Banksia ericifolia</i>	Heath-leaved Banksia
<i>Bauera rubioides</i>	River Rose
<i>Melaleuca squamea</i>	Swamp Honey-myrtle
<i>Kunzea ambigua</i>	Tick Bush
<i>Leucopogon ericoides</i>	Pink Beard-heath
Groundcover	
<i>Caustis pentandra</i>	Thick Twist-rush
<i>Dianella revoluta</i>	Blueberry Lily
<i>Echinopogon caespitosus</i>	Hedgehog Grass
<i>Epacris microphylla</i>	Coral Heath
<i>Hibbertia fasciculata</i>	Bundled Guinea Flower
<i>Imperata cylindrica</i>	Blady Grass
<i>Leptospermum laterale</i>	Variable Sword-sedge
<i>Lomandra longifolia</i>	Mat Rush



Baumea juncea



Carex appressa



Eleocharis acuta



Juncus kraussii



Lomandra longifolia



Imperata cylindrica



Triglochin procerum



Potamogeton tricarlinatus



Carex appressa



Dianella revoluta



Leucopogon ericoides



Echinopogon caespitosus



Banksia ericifolia



Bolboschoenus fluviatilis



Epacris longifolia



Kunzea ambigua



Banksia integrifolia



Casuarina glauca



Corymbia maculata



Melaleuca quinquenervia

8.8.5 Streetscapes (President Avenue, West Botany Street, Civic Avenue) planting strategy

Landscaping in streetscapes provides a wide range of benefits for local residents and visitors including increased comfort for residents through shading and amenity values, habitat for birds and other wildlife, improved health and well-being and screening for local residents.

The key consideration for landscape and planting design is to maximise the opportunity for soft landscaped areas and street tree plantings as much as possible with the simple aim to offset the scale of the works.

Along President Avenue, narrow planted verges will be reinstated where space permits once pedestrian and road facilities have been constructed. A number of wide medians will also be planted to improve visual amenity. All intersecting roads and streets will be seamlessly tied into their respective conditions to create a smooth transition.

Existing trees have been retained where possible. The existing row of gum trees along the northern side of President Avenue have been retained to maintain screening to the existing apartment buildings.

New street trees will be provided where possible beyond the clear zone requirements nominated under Austroads Guidelines. Planting selection for streetscape focuses on species that are hardy, resilient and easy to maintain with a proven track record in road environments.

The design and spacing of street tree planting will meet the requirements of Bayside Council and their DCP 2013 (Amendment 8) 'Landscaping and Tree Management' and TfNSW's Landscape Design Guideline (2018).

Rockdale Motorway Operations Complex (MOC3)

MOC3 is located along West Botany Street adjacent to Rockdale Bicentennial Park. The architectural design of the building provides a well articulated monolithic brick facade that is setback approximately 4.5 metres from the existing footpath for a landscaping zone. The landscaping zone will comprise street trees and massed planting less than 1 metre in height to compliment the building and assist with scaling-down the building to the street.

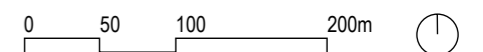
The design of the MOC3 and associated operational buildings are described in Section 12.2 of the report.



Artist's impression: View of MOC3 from West Botany Street (trees and landscaping shown at maturity).



Figure 8-29: Precinct plan of President Avenue, West Botany Street and Princes Highway. Scale 1:5000



Landscape design strategy

The following diagram illustrates the overall landscape and planting design strategy adopted in the design.

- LEGEND
- - - Project Boundary
 - Proposed tree planting/s
 - Publicly accessible turf areas
 - Landscape revegetation areas
 - Riparian / wetland vegetated swale planting
 - /// Buffer / screen planting areas
 - ▶ Prominent contextual and filtered landscape vistas incorporated into the landscape design

EXISTING MATURE STREET TREES ALONG PRESIDENT AVENUE HAVE BEEN RETAINED WHERE POSSIBLE TO MINIMISE VISUAL IMPACTS TO EXISTING RESIDENTIAL APARTMENT BUILDINGS.

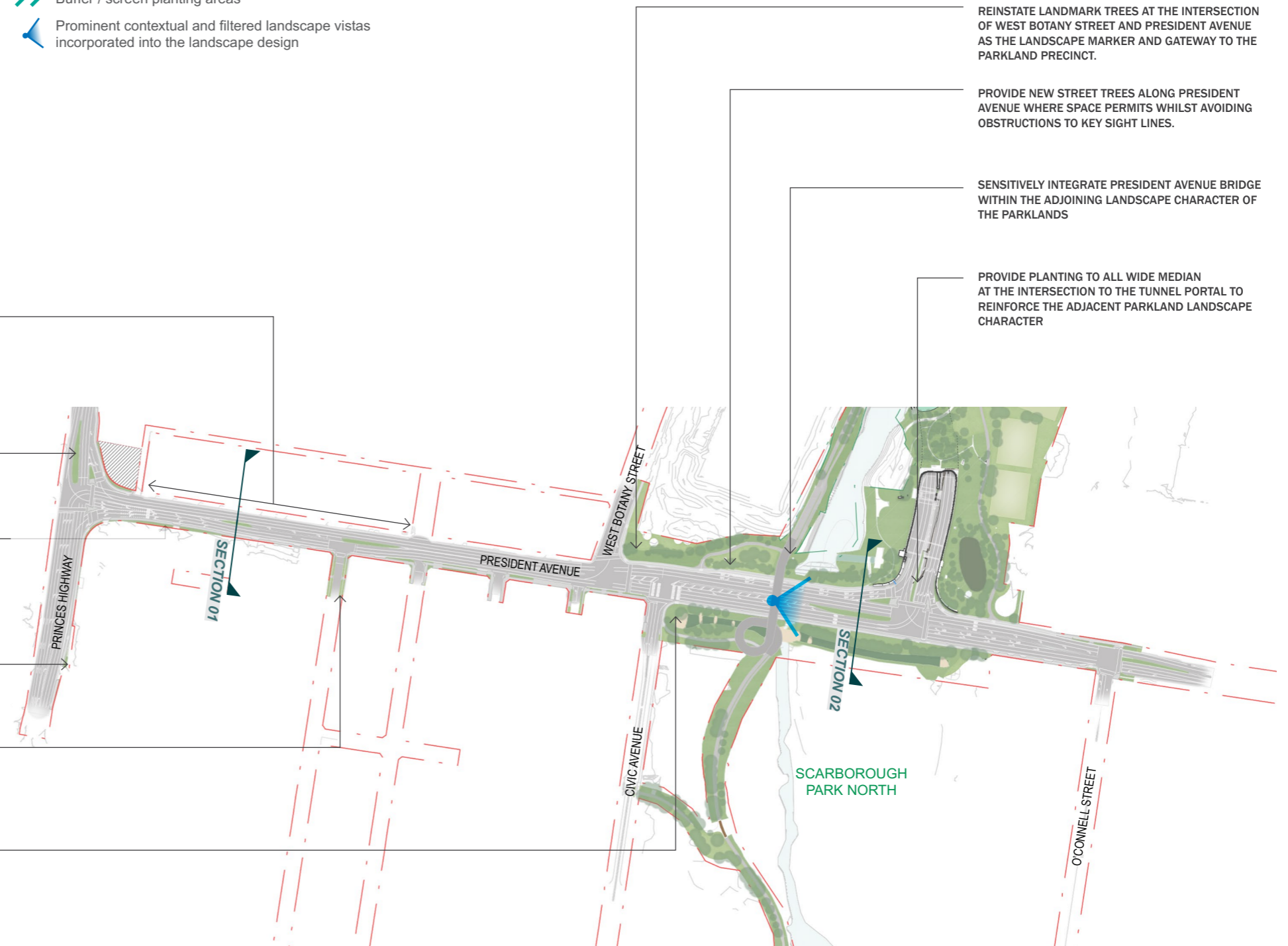
PROVIDE PLANTING TO ALL WIDE MEDIAN ALONG THE PRINCES HIGHWAY GREATER THAN 2.5 METRES IN WIDTH TO IMPROVE THE VISUAL AMENITY OF THE STREET AND REDUCE HEAT ISLAND AFFECT.

WHERE SPACE PERMITS. VERGES WILL BE PLANTED TO IMPROVE THE VISUAL AMENITY OF THE STREET ALONG PRESIDENT AVENUE

TIE INTO EXISTING PLANTING AREAS AND STREETScape CHARACTER ALONG PRINCES HIGHWAY

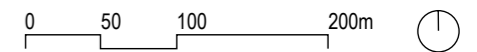
SEAMLESSLY TIE IN WITH THE EXISTING LANDSCAPE CHARACTER OF ADJOINING STREETS THROUGH APPROPRIATE SELECTION OF PLANTING, TURF AND TREE SPECIES.

NEW LANDSCAPE CONNECTION TO THE ATC FROM CIVIC AVENUE TO BE ACCENTUATED BY OPEN LANDSCAPE CHARACTER WITH TALL TREES FOR SHADE AND VEGETATED SWALES



- REINSTATE LANDMARK TREES AT THE INTERSECTION OF WEST BOTANY STREET AND PRESIDENT AVENUE AS THE LANDSCAPE MARKER AND GATEWAY TO THE PARKLAND PRECINCT.
- PROVIDE NEW STREET TREES ALONG PRESIDENT AVENUE WHERE SPACE PERMITS WHILST AVOIDING OBSTRUCTIONS TO KEY SIGHT LINES.
- SENSITIVELY INTEGRATE PRESIDENT AVENUE BRIDGE WITHIN THE ADJOINING LANDSCAPE CHARACTER OF THE PARKLANDS
- PROVIDE PLANTING TO ALL WIDE MEDIAN AT THE INTERSECTION TO THE TUNNEL PORTAL TO REINFORCE THE ADJACENT PARKLAND LANDSCAPE CHARACTER

Figure 8-30: Landscape Strategy Plan - streetscape areas



Typical sections

Typical sections through the site are provided within this section to illustrate the landscape design approach.

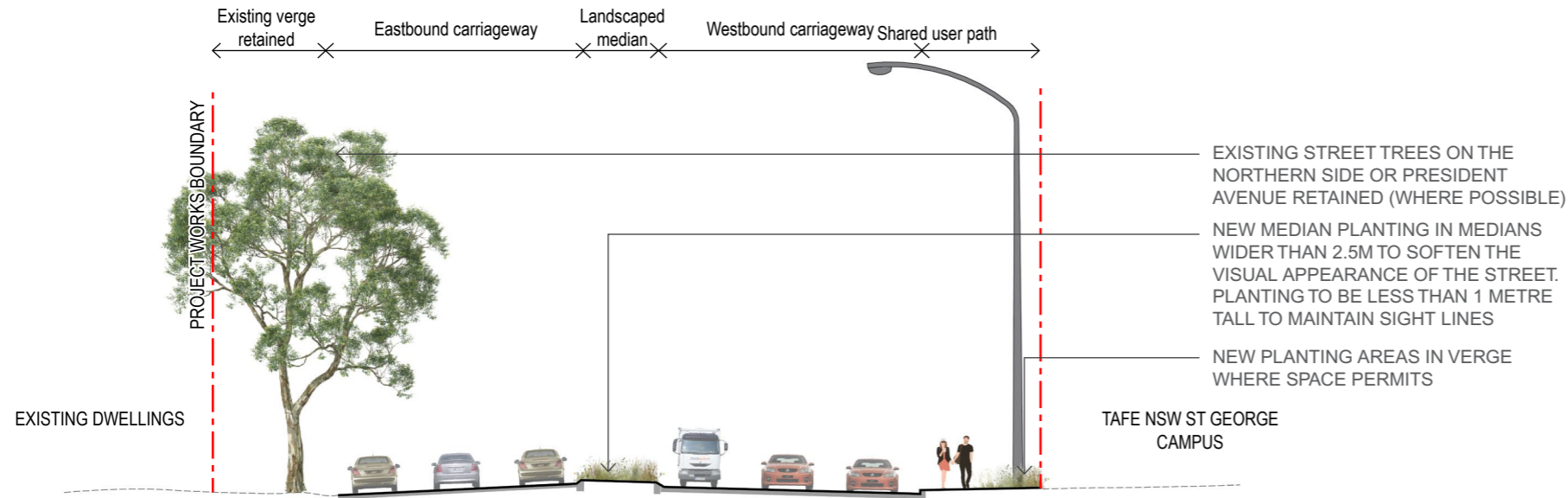


Figure 8-31: Section 01 - Typical section through President Avenue. Scale 1:200



Key plan

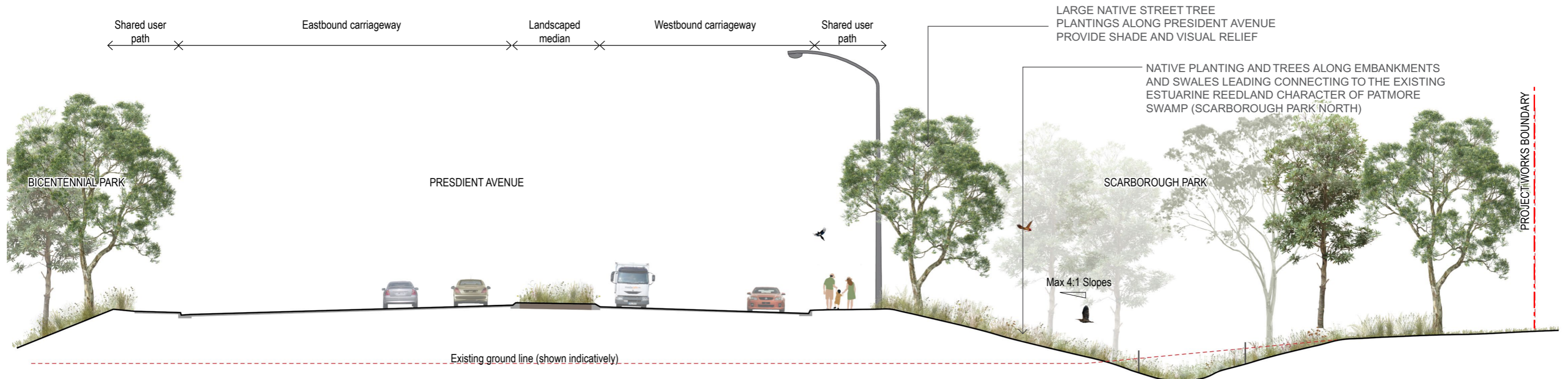


Figure 8-32: Section 02 - Typical section through President Avenue adjacent to Rockdale Bicentennial Park. Scale 1:200

0 2 4 8m



Artist's Impression: Driver's view south along President Avenue (trees and landscaping shown at maturity).

Plant species selection

The following typical planting typologies will be utilised along streetscapes:

- Ground layer massed planting and low shrubs
- Bulky shrubs and small trees
- Street tree planting.

Planting to these areas is selected for robustness and maintenance criteria in a streetscape setting, as well as to provide visual display and contribute to wayfinding. An outline of the main plant species proposed for streetscape areas is provided in the following tables.

Streetscape plant species list

Botanical Name	Common Name
TREES	
<i>Angophora costata</i>	Sydney Red Gum
<i>Cupaniopsis anacardioides</i>	Tuckeroo
<i>Corymbia gummifera</i>	Red Bloodwood
<i>Elaeocarpus reticulatus</i>	Blueberry Ash
<i>Eucalyptus robusta</i>	Swamp Mahogany
<i>Eucalyptus saligna</i>	Sydney Blue Gum
<i>Melaleuca linariifolia</i> 'Snow in Summer'	Snow in Summer
<i>Melaleuca quinquenervia</i>	Broad Leaved Paperbark
SHRUBS	
<i>Banksia spinulosa</i> 'Coastal Cushion'	Coastal Cushion
<i>Callistemon</i> 'Green John'	Green John
<i>Callistemon</i> 'White Anzac'	White Anzac
<i>Westringia fruticosa</i> 'Zena'	Zena
GROUND COVERS / NATIVE GRASSES	
<i>Crinum pedunculatum</i>	Swamp Lily
<i>Dianella caerulea</i>	Flax-lily
<i>Grevillea juniperina</i> 'Gold Cluster'	Juniper Lead Grevillea
<i>Grevillea lanigera</i> 'Mt Tamboritha'	Spider Flower
<i>Grevillea rosmarinifolia</i>	Rosemary Grevillea
<i>Hibbertia scandens</i>	Snake Vine
<i>Lomandra</i> 'Lime Tuff'	Lime Tuff
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Lomandra</i> 'Verday'	Verday
<i>Myoporum parvifolium</i>	Creeping Boobiolla
<i>Poa labillardierei</i>	Tussock grass



Angophora costata



Cupaniopsis anacardioides



Native grass understorey and medians



Corymbia gummifera



Elaeocarpus reticulatus



Eucalyptus robusta



Eucalyptus saligna



Melaleuca quinquenervia



Banksia 'Coastal Cushion'



Callistemon 'Green John'



Westringia 'Zena'



Crinum pedunculatum



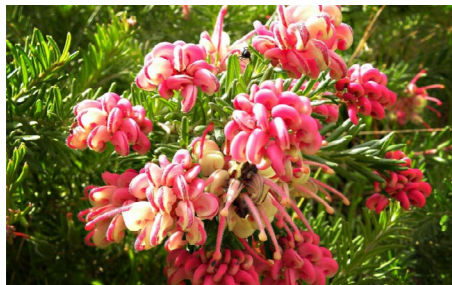
Dianella caerulea



Grevillea rosmarinifolia



Grevillea 'Gold Cluster'



Grevillea lanigera



Hibbertia scandens



Lomandra 'Lime Tuff'



Lomandra longifolia



Lomandra 'Verday'



Myoporum parvifolium



Poa labillardierei



Callistemon 'White Anzac'