

SHORELINE OPEN SPACE LANDSCAPE STRATEGY



Prepared for
Shoreline Redlands Pty Ltd



Biodiversity
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Purpose of Report

Biodiversity Assessment and Management Pty Ltd has produced this report in its capacity as {consultants} for and on the request of Shoreline Redlands Pty Ltd (the "Client") for the sole purpose of providing an Open Space Landscape Strategy for the proposed Shoreline project development area, Redland Bay (the "Specified Purpose"). This information and any recommendations in this report are particular to the Specified Purpose and are based on facts, matters and circumstances particular to the subject matter of the report and the Specified Purpose at the time of production. This report is not to be used, nor is it suitable, for any purpose other than the Specified Purpose. Biodiversity Assessment and Management Pty Ltd disclaims all liability for any loss and/or damage whatsoever arising either directly or indirectly as a result of any application, use or reliance upon the report for any purpose other than the Specified Purpose.

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Date: 9th November, 2016



Managing Director

SHORELINE OPEN SPACE LANDSCAPE STRATEGY

REDLAND BAY

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Table of Terms and Abbreviations

BAAM	Biodiversity Assessment and Management Pty Ltd
LP Act	<i>Land Protection (Pest and Stock Route Management) Act 2002</i>
RE	Regional Ecosystem
RCC	Redland City Council
WONS	<i>Weeds of National Significance</i>

1.0 INTRODUCTION

Biodiversity Assessment and Management (BAAM) have prepared this Open Space Landscape Strategy for the Shoreline development at Redland Bay for Shoreline Redlands Pty Ltd.

The Shoreline development area is shown on the Draft Master Plan presented as **Figure 1.1**.

1.1 STUDY AREA

The Shoreline development area is comprised primarily of cleared areas that support rural land uses, with scattered individual trees and vegetated patches associated with drainage lines. For the most part the eastern boundary of the area is defined by Moreton Bay and associated intertidal environs. Land to the west is heavily vegetated and forms part of a larger tract of bushland supporting both remnant and non-remnant vegetation.

1.2 STUDY AIMS

The main purpose of this Open Space Landscape Strategy is to present a coordinated vision for the Shoreline development Open Space area. Specifically, the Strategy aims to:

- Identify management areas subject to the Open Space Landscape Strategy;
- Develop appropriate, planting layout and species list that complies with and coordinates the outcomes required under the Shoreline Biting Insect Management Plan (as per frc environmental 2015) within each management area;
- Set out the locations and characteristics of open space corridors to facilitate wildlife movement; and
- Clearly identify Water Sensitive Urban Design Areas and proposed Detention Basins and design elements as defined within the water sensitive urban design report (Design Flow 2014).

1.3 OVERVIEW

This Strategy is intended to identify proposed land use type in accordance with the overall Shoreline Infrastructure Master Plan. The Strategy identifies three land use types relevant to Open Space Management Areas:

- Foreshore Open Space;
- Conservation Areas; and
- Open Space Corridors.

The Open Space Landscape Strategy will also provide guidance on the provision and location of Koala food trees to offset the loss of these within the development footprint.

1.4 METHODOLOGY

The project team has undertaken a number of field studies throughout the planning process, which investigated the study area in detail, and enabled the identification of key open space areas and important habitat values.

The proposed open space management areas have been identified from the Shoreline Public Parks and Community Facilities Network and the Stormwater Network as shown in **Appendix 5**.

The native species planting list has been collated for each of the management areas in accordance with the Redland City Council's (2007) Vegetation Enhancement Strategy and the Regional Ecosystem Technical Descriptions (DERM 2012), together with the results of field surveys which confirmed existing native vegetation within the management areas.

When selecting and locating vegetation in landscaping projects all hazards associated with that vegetation will be identified to manage and reduce the risks to public safety in the short, medium and long-term to people, property and the environment (RCC 2007).

Land use strategies in each management area have been developed to comply with the Shoreline Biting Insect Management Plan (frc environmental 2015) with the overall aim of supporting the Shoreline Infrastructure Master Plan.



Notes: Image sourced from Nearmap (c) 2014

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree



1:11,000 at A4
0 50 100 200 300 400 500 Meters

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LEGEND

Proposed Landuse

- | | | | |
|--|---------------------------|--|--------------------------|
| | 1 = Foreshore Open Space | | 6 = Traditional Res 12 |
| | 2 = Primary Corridor | | 8 = Village Centre |
| | 3 = High Density Res 60 | | 9 = Conservation Area |
| | 4 = Medium Density Res 30 | | 10 = Open Space Corridor |
| | 5 = Small Lot Res 15 | | |

Drawn By: MG Reviewed by: AC Date: 6/6/2015

Concept Stormwater Network

Future Improvements

- Concept - Indicative Detention Basin
- Indicative Water Sensitive Urban Design Area
- Waterways & Waterbodies
- Concept Stormwater Catchment
- Development Boundary

Figure: 1-1
Title: Location of Management Areas and Stormwater Network
Project: Open Space Landscape Strategy
Client: Fox and Bell Group

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2.0 LAND USE PURPOSE AND STRATEGY

The Open Space Areas will be designed and managed to ensure that they include recreational park areas and community facilities, whilst also providing important flora and fauna habitats and safe fauna movement opportunities.

The open space environments will incorporate Crime Prevention through Environmental Design (CEPTED) principals which is based on the following premise: "That the proper design and effective use of a built environment can lead to a reduction in the fear and incidence of crime, and thus a better quality of life".

The provision of walkways and lighting where required, will incorporate CEPTED design elements and be positioned to minimise barriers or impediments to fauna movements within Open Space Areas.

2.1 FORESHORE OPEN SPACE AREA

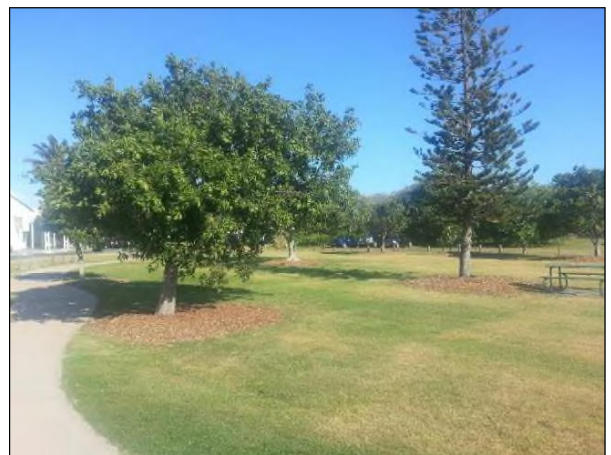
Purpose:

The Foreshore Open Space Area is located on the eastern boundary of the Shoreline development area and adjoins the marine environments of Moreton Bay for most of the length of the development area. The Foreshore Open Space Area is intended to provide linkage to Weinam Creek via pedestrian cycle way, with mixed use for recreation and natural amenities.

The Foreshore Open Space will be designed to minimise the occurrence of biting insects around high activity areas. Specifically, trees with high canopies providing for good air circulation at ground level offer an obvious benefit to prevent mosquito and biting midge inhabitation (frc environmental 2015). As such, existing tall vegetation will be retained if it does not pose public risk. The open space areas will generally provide a 100 m setback from mosquito breeding or roosting habitats and properties.

The Foreshore Open Space Area will retain strategically located native vegetation to provide a green link and buffer to the marine habitats whilst also providing valuable Koala food trees. The Foreshore Open Space Area will support a mosaic of vegetated and open parkland areas to provide an aesthetic and welcoming environment for residents and

visitors to the area, whilst also providing safe movement options for resident fauna (refer to **Appendix 2** for indicative management strategies). Weed management will be initiated in areas where patches of native vegetation are being retained within the foreshore opens space area, e.g. northern Conservation Area. The edges of retained bushland areas will be densely planted with low-maintenance native grasses and low growing ground cover to prevent subsequent weed intrusions. All other areas within the foreshore open space will consist of mown grass interspersed with retained Koala feed trees and some additional planted native trees (refer to **Appendix 1 Table 1 and 2**).



Example of intended vegetation layout along Foreshore Open Space Area (from Cleveland Point Park)

The following strategies are key the success of the open space management areas. These strategies will be clearly described and illustrated in planning and works applications for future stages of the development.

Strategy:

- a) Ensure retained and planted trees and shrubs within the Foreshore Open Space (excluding the areas identified in the approved Shoreline Master Plan as Conservation Area) are sparsely planted with an understorey of low-maintenance native grasses to encourage sea breeze and reduce the incidence of mosquitoes and biting midges;
- b) Design of the Foreshore Open Space does not result in the clearing of non-juvenile Koala habitat trees in areas identified as bushland habitat in the *South East Queensland Koala Conservation State*

Planning Regulatory Provision (or as varied by this Preliminary Approval);

- c) Design of the Foreshore Open Space must avoid clearing non-juvenile Koala habitat trees in areas of high value rehabilitation habitat, and medium value rehabilitation habitat in the *South East Queensland Koala Conservation State Planning Regulatory Provision* (or as varied by this Preliminary Approval), with any unavoidable clearing minimised and offset in accordance with the *Environmental Offsets Act 2014*;
- d) Design and layout of the Foreshore Open Space Area provides for safe fauna movement opportunities (including Koalas), ensuring that the siting and design of infrastructure in the Area does not inhibit fauna movement;
- e) Design and layout of the Foreshore Open Space Area complies with the approved Shoreline Biting Insect Management Plan;
- f) Design and layout of the Foreshore Open Space complies with the approved Overall Bushfire Management Plan “Redlands Shoreline Development”;
- g) Planting species are such that at least 70% are in accordance with the Vegetation Enhancement Strategy (RCC 2007 or equivalent future versions published by Council). Where exotic species are used for the balance 30% maximum, environmentally invasive species should be avoided;
- h) Strategic weed control and maintenance is undertaken along edges of retained bushland areas; and
- i) An esplanade road adjoins the western boundary of the Foreshore Open Space to increase the buffer to properties.

2.2 OPEN SPACE CORRIDORS PURPOSE:

The purpose of the Open Space Corridors is to encourage and provide for safe wildlife movement between existing patches of vegetation through active revegetation. This strategy will allow vegetation from the eastern portions of the Shoreline development area to connect with bushland areas to the west.

The overall outcome is to re-establish disturbed or degraded areas with native vegetation and provide habitats in which native wildlife can live,

breed and utilise as wildlife corridors. There will be opportunities through appropriate site design, to include recreational parkland facilities and stormwater devices within these areas, provided the higher objective of habitat connectivity is protected.

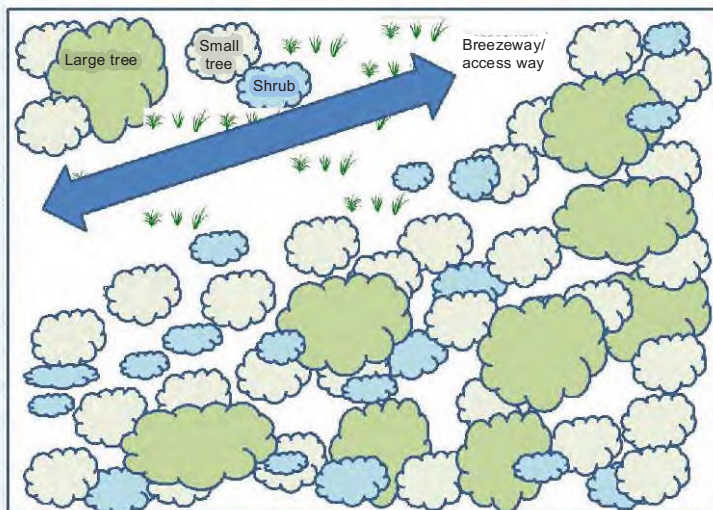
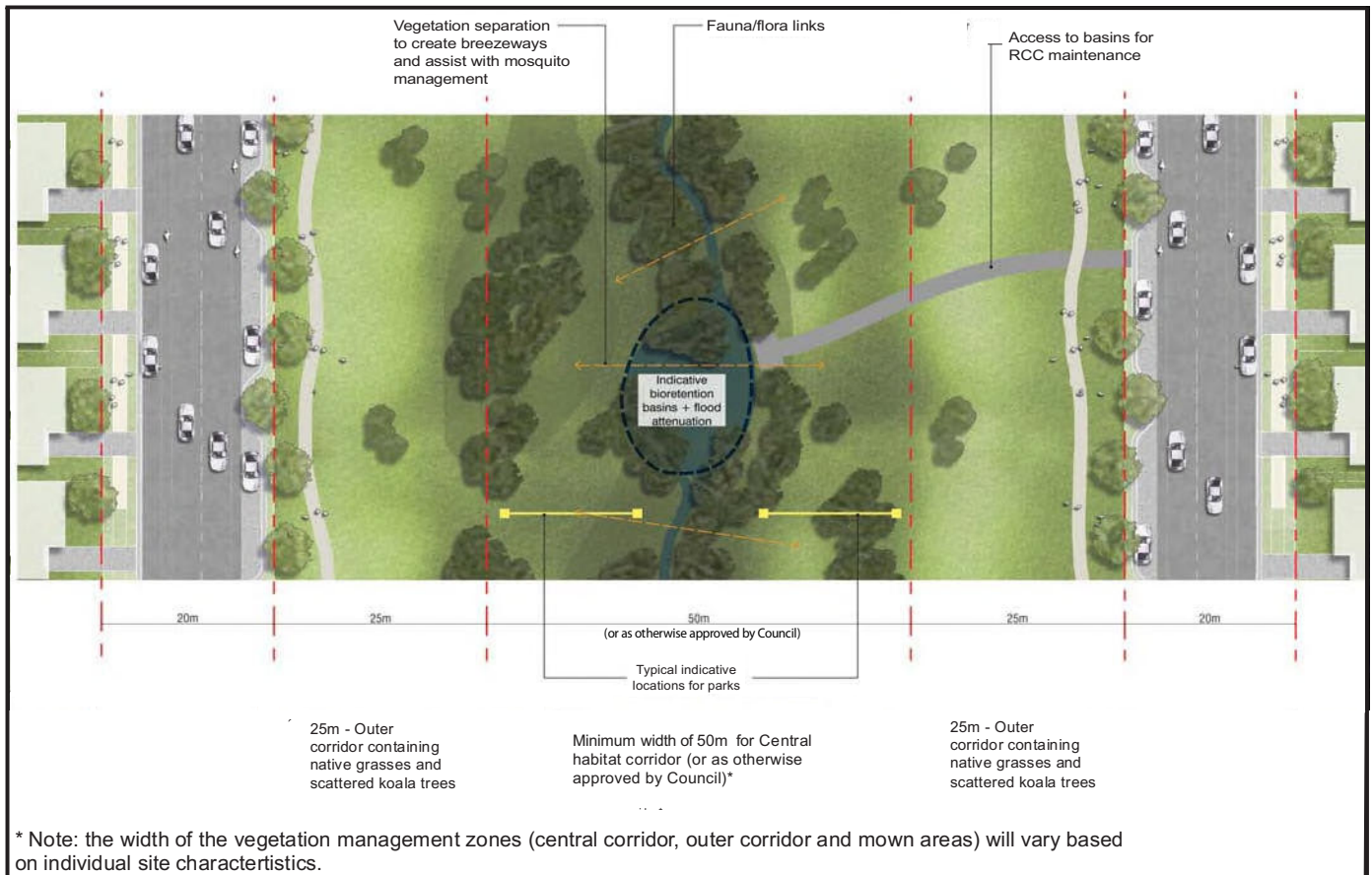
The Open Space Corridors will consist of a mosaic of low-maintenance native grass areas and tall trees to provide a breezeway to minimise biting insect connectivity. The corridors will be a minimum of 100 m wide providing a 75 m buffer to freshwater biting insect breeding habitat and a 50 m buffer to roosting habitat (including road reserves). This open-space area will consist of a central portion at least 50 m wide (or as otherwise approved by Council), which facilitates provision of wildlife habitats that will be buffered by a 25 m sparsely planted and low-maintenance grass area, with tall Koala food trees. The central portion is further separated from residences by roads and verges to reduce the incidence of biting midges and mosquitos. **Figure 2.1** provides an indication of strategies for vegetation and biting insect management within Open Space Corridors that do not support parklands. **Appendix 2** provides indicative strategies for vegetation and biting insect management for all proposed uses within the open space corridors (parks, sports fields, bio retention basins, etc.).

Whilst addressed in a stand-alone report (Design Flow (2016) presented in **Appendix 6**, the Storm Water management network forms a part of the Open Space Corridors. The planting within a proposed Detention Basin and Water Sensitive Urban Design Areas will be undertaken in accordance with RCC's (2008) Planning Scheme Policy.

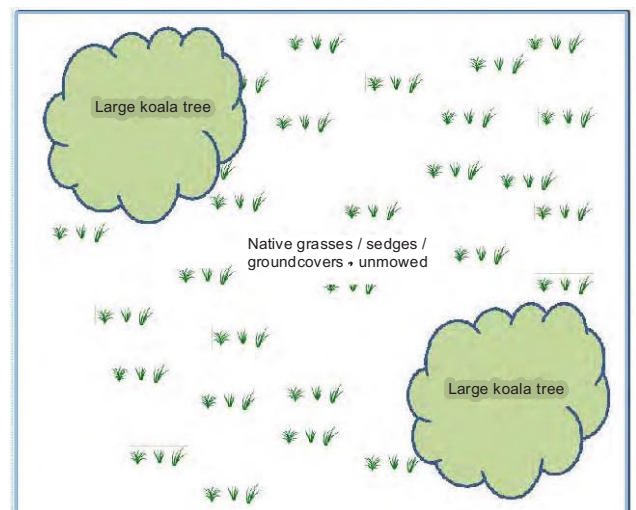
Access for maintenance of plantings and stormwater ponds/retention basins will be via sensitively designed access pathways similar to those shown in **Figure 2.2**.

The stormwater retention areas will provide increased moisture which will add to the overall habitat components for those native species favouring wet conditions.

The following strategies will be clearly described and illustrated in planning and works applications for future stages of the development.



(A) At least 50 m wide (or as otherwise approved by Council)



B) Approximate arrangement for planting in outer corridor (at least 25m x 25m)

See Table 4 for suggested planting schedule

Figure:	2-1
Title:	Indicative planting for open space corridor
Project:	Open Space Landscape Strategy
Client:	Shoreline Redlands Pty Ltd



Figure 2.2. Representative photographs showing access options to allow-maintenance works within stormwater ponds/retention basins.

Strategy:

- a) All Open Space Corridors are no less than 100 m in width, with the central habitat core being at least 50 m (or as otherwise approved by Council) and the two buffer areas at least 25 m wide each;
- b) All Open Space Corridors are designed and planted in accordance with the Biting Insect Management Plan, incorporating an outer frame of high canopy trees and low-maintenance native grasses to provide a buffer between core habitat areas that provide roosting habitat for biting insects and properties. Recreational parks, footpaths/cycleways and water quality devices located in these areas will subject to separate landscaping requirements.
- c) Design and layout of the Open Space Corridors should provide continuity of core habitat and natural waterway channels that supports safe fauna movement opportunities and prevents fragmentation of habitat, ensuring that the siting and design of infrastructure (including recreation areas, pathways/cycleways, stormwater facilities, maintenance access etc) in these areas does not inhibit safe fauna movement (e.g. road underpasses / overpasses;
- d) Planting design must incorporate a selection of replanting species in accordance with the Vegetation Enhancement Strategy (RCC 2007 or equivalent future versions published by Council). In the habitat core it must incorporate suitable plant species with appropriate forms to provide structural complexity and soil stability;
- e) Corridor design must avoid placement of pedestrian and cycle pathways through continuous habitat, with public use kept to areas within or immediately adjacent to roads, designated parks and stormwater facilities;
- f) Corridor design must avoid public and environmental risk, in accordance with CPTED principles;
- g) The design of road underpasses / overpasses and exclusion fencing for native fauna must be in accordance with the *Koala-sensitive Design Guideline*. A *guide to Koala sensitive design measures for planning and development activities* November 2012 Department of Environment and Heritage Protection. A minimum standard for fauna crossings will be generally in accordance with Options C, D and E on pages 18 to 21 of this Guideline;

- h) Roads that dissect Open Space Corridors (excluding Serpentine Creek Road, Scenic Road and Orchard Road) must limit vehicle speed to 30 km/hr;
- i) Planting of wetland sedge and tufted species along rehabilitated waterways and water bodies must be substantially commenced before construction of upstream development is commenced.

2.3 CONSERVATION AREA

Purpose:

The Conservation Areas are formed around existing patches of vegetation in order to preserve their conservation values. Currently, there are two main Conservation Areas; one located at the north-eastern extent of the study area, and the other being Lot 1 on RP133830, which forms part of the Open Space Corridor stretching from the eastern boundary to the western boundary of the development site.

These Conservation Areas will hold a higher likelihood of harbouring mosquitos and in addition to the provision of the road buffers the nearby properties will be subject to specific design requirements in the Shoreline Plan of Development **Appendix 2** provides indicative strategies for vegetation management for development adjacent to Conservation Areas.

Rehabilitation, management and maintenance of these areas is generally in accordance with the following sections of the Redland City Council's Conservation Land Management Strategy 2010: A plan for the next 10 years:

- Section 5.4 Nature Belt (NB);
- Section 5.7 Conservation Coastal Foreshore (CCF);
- Section 7.13 Rehabilitation, Enhancement and Maintenance (Principles 1-14 for NB and CCF); and
- Section 7.2.1 Specific Management Zones (Principles 1-8, 10, 14 and 20 for NB and CCF).

The following strategies will be clearly described and illustrated in planning and works applications for future stages of the development.



Representative image of the Conservation Area at the northern extent of the development area.



Representative image of the Conservation Area which forms part of the central Open Space Corridor.

Strategy:

Conservation Areas maintain, enhance and protect environmental values by ensuring:

- a) Degraded and cleared areas are restored and revegetated in planned, managed and implemented in accordance with best practice guidelines (for example the SEQ Ecological Restoration Framework);
- b) Revegetation of the conservation land to be dedicated to Council must include planting at 2/m² with a mix of ground covers/shrubs/mid canopy and canopy in accordance with the approved RE species list. Trees must be planted at 5 m spacing and comply with the approved RE species list. Watering must be undertaken to ensure establishment. Maintenance must be undertaken at monthly intervals for the first 3 years and then scaled back to 8 visits per year (6 week intervals) for the remaining 2 years;
- c) Retained Conservation Areas are protected and enhanced in accordance with best practice guidelines (including

Redland City Council's Conservation Land Management Strategy 2010);

- d) Weed control incorporates monthly maintenance, including seed head removal to be undertaken for the first 3 years from dedication of the conservation land and then scaled back to 8 visits per year (6 week intervals) for the remaining 2 years;
- e) No clearing of native vegetation is to be undertaken within Conservation Areas unless required for safety, infrastructure maintenance or bushfire management;
- f) The placement of clear signage that requires limiting disturbance of habitat areas and indicating specified access points;
- g) Native animal movement through the area is protected and supported;
- h) Only endemic native species are planted within Conservation Areas, in accordance with the relevant version of the Vegetation Enhancement Strategy or equivalent Council instrument;
- i) The introduction of non-native plants or animals into the area is avoided;
- j) Stormwater runoff is managed and water quality enhanced;
- k) Overland drainage systems and waterways are maintained in, or returned to, their natural state where possible;
- l) Specific habitat for vulnerable species, such as the Glossy Black-Cockatoo and the Koala is retained and protected;
- m) Noise, artificial light and access by non-native animals is directed away from Conservation Areas; and
- n) Species with dense foliage are only planted as part of the edge-seal planting to reduce edge effects and increase buffers to core habitats.

3.0 REVEGETATION STRATEGIES

The overall aim of revegetation strategies within the development area is to prescribe each of the management areas with the appropriate strategies for restoring native vegetation. These strategies have been established based upon land use purpose for each of the management areas and include consideration of the need to manage mosquitoes and biting midges for adjacent land uses.

The management intent for all open space areas is provided in **Appendix 1**.

3.1 FORESHORE OPEN SPACE AREA

The overall aim of revegetation within Foreshore Open Space Area is to enhance shade in recreational areas, especially around the sporting fields and playgrounds (refer to **Appendix 2** for indicative management strategies).

Whilst important koala food trees are intended to be retained within Foreshore Open Space Area, no additional tall trees will be planted in areas dedicated for recreational uses, particularly eucalyptus trees that may pose public risk from falling branches. Provision of shade is proposed to be met by planting smaller trees (**Appendix 1 Table 1 and 2a, 2b**). However, to facilitate safe Koala movements between retained vegetated habitats, additional Koala food trees, preferably *Eucalyptus tereticornis* will be planted in areas that do not pose a public risk, or interfere with visual amenity.

The provision of a nominal 100 m wide sparsely-vegetated buffer zone between the shore (HAT) and the residential and community precincts will minimise the incidence of mosquitoes and biting midges within high activity areas.

Revegetation within the Foreshore Open Area where necessary will be designed and managed so as to not impede drainage (frc environmental 2015) (refer to **Appendix 2** for indicative management strategy).

Whilst the formal parkland setting will limit the chances of weed infestation within this area, disturbance related to revegetation may stimulate the germination of weed seeds. As such, ongoing monitoring and management will ensure detection of any significant infestation and the application of appropriate treatment strategies.

3.2 OPEN SPACE CORRIDOR

The revegetation strategy within Open Space Corridors is intended to connect existing patches and revegetated tracts of land.

The Open Space Corridor Areas will be revegetated with tall trees, including species such as *Eucalyptus tereticornis*, *Melaleuca*

quinquenervia, *Eucalyptus seeana*, and *Lophostemon suaveolens*. The central 50 m (or as otherwise approved by Council) core habitat will be planted to provide wildlife habitats whilst the outer 25 m on either side will be sparsely planted to provide an open environment which will reduce the likelihood of mosquitoes and will provide habitat for fauna species which prefer to move through more open areas (e.g. Wallabies and Koalas) (refer to **Appendix 2** for indicative management strategies). The outer grassy areas with sparse tall trees will form a buffer to residential areas from potential mosquito breeding and roosting habitat. Recommended species and densities for the riparian, non-riparian, outer corridor and bioretention basis are provided in (**Appendix 1 Table 3 and 4a,b,c,d**).

It is expected that once cattle have been removed from areas within the open space corridors and linkages, natural regeneration of native species will occur to various degrees within these areas. Planting pallets and densities for revegetation will therefore be influenced by natural recruitment and will be designed to reflect the pre-clear vegetation communities, wherever practical, with a bias towards planting Koala habitat trees.

Weed management within the Open Space areas will be undertaken to ensure that corridors do not provide an increased conduit for weed species to intrude into remnant vegetation to the west.

3.3 CONSERVATION AREA

The revegetation strategy within Conservation Areas is intended to minimise the effect of potential weed intrusion and on-going native bushland degradation from the processes of edge effects. The edges of Conservation Areas are proposed to be revegetated with native species characterised by dense foliage to provide a physical barrier against weed intrusion (**Appendix 1 Table 4 and 5**).

The Conservation Areas will be managed to ensure suitable levels of natural recruitment and succession occur.

Active removal and continued management of major weed infestations will also be undertaken within the Conservation Areas in a manner that minimises any potential impacts on existing native vegetation.

The Conservation Areas will be protected from any infrastructure associated with the development, wherever practical, and any incursions for provision of services will be remediated immediately after construction.

Conservation Areas immediately adjacent to residential areas will be planted with trees and shrubs that have light foliage to reduce the incidence of mosquito and midge near high activity areas (refer to **Appendix 2** for indicative management strategies). Specifically, this will be a 20-30 metre buffer consisting of a mown grassed area in addition to road frontage and a footpath to reduce harbourage areas for these biting insects (Queensland Health 2002).

Residences and dwellings adjoining Conservation Areas will be subject to specific design responses to minimise the occurrence of mosquitoes within these dwellings.

There are no gathering or passive recreation areas within the conservation zones.

Revegetation is planned, managed and implemented in accordance with best practice guidelines (for example the SEQ Ecological Restoration Framework and Redland City Council's Conservation Land Management Strategy 2010).

4.0 WEED MANAGEMENT PLAN

4.1 GENERAL WEED MANAGEMENT STRATEGIES

A total of four species listed under the *Land Protection (Pest and Stock Route Management) Act 2002* have been recorded within the Open Space Management areas. These species include Lantana, Camphor Laurel, Brazilian Pepper and Singapore Daisy. All four species are classified as Class 3 weeds and require control (under the LP Act 2002) if they occur adjacent to Environmentally Significant Areas, including Essential Habitat, in consultation with the Council's Parks and Conservation Group (RCC 2012). However, the management intent is to actively manage these species within the local landscape to minimise negative impacts on the re-establishment of native flora and potential to spread into adjacent lands.

Detailed weed species profiles and corresponding management strategies are provided in **Appendix 2**.

Weed removal will be conducted in patches of a manageable size, commencing in areas that are least disturbed and moving to sites of greater weed abundance. This strategy follows the principles of the highly successful Bradley Method of Bush regeneration (Bradley 1971). Works will not commence on an area until the previous rehabilitation site has become self-sustaining (i.e. requiring only minimal control of weeds). This strategy will minimise the risk of recurring weed invasions by providing an environment conducive to the re-generation of native species.

4.2 WEED CONTROL METHODS

Brief descriptions of weed control techniques that may be utilised within the development area are provided **Appendix 3**). These control techniques can be broadly divided into three categories:

- Manual Control;
- Chemical Control; and
- A combination of mechanical and chemical control.

Manual control techniques utilise mechanical force to remove the entire plant and its roots and may be applied to areas of small infestations or for new weed growth. These techniques are especially useful to control grasses, some seedlings, succulents and shallow-rooting woody plants.

Chemical control techniques (e.g. the application of Glyphosate) are used to disrupt biochemical pathways within plants, leading to tissue death. Chemical control is particularly useful where a large area with a high biomass of leaves has to be controlled (e.g. areas that are infested with weedy ground cover).

Chemical control techniques include: spraying, tree injection, and the Basal Bark Spray method.

Techniques that combine both manual and chemical techniques are particularly effective where a plant is too large to be controlled with the chemical or the manual techniques alone and is particularly useful for large woody specimens (e.g. Broad-leaved Pepper). Techniques that are included under this category are: chipping, tree spearing, scraping the stem and applying chemical and the Cut Stump method.

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APPENDIX 1

Management Area Information

Table 1. Foreshore Open Space Area Management Intent

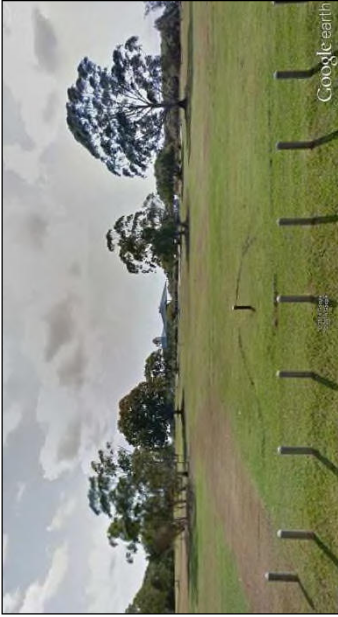
Management Area: Foreshore Open Space	Major Weeds Present	Goal for Management Area
 A Google Earth snapshot from Victoria Point showing an indicative planting layout within Foreshore Open Space area. General Comments: The proposed Foreshore Open Space currently supports a mixed land use of agriculture, non-remnant vegetation and open paddock. The main objectives for this management area are: - to maintain an open area with sparse tree cover for shade; - to provide a green link and buffer to the marine habitats environment; - to retain important food trees for koalas; and - to reduce the incidence of biting insects by implementing revegetation layout that complies with the Shoreline Biting Insect Management Plan (frc Environmental 2015).	Slash Pine (<i>Pinus elliotii</i>) Lantana (<i>Lantana camara</i>) Brazilian Pepper (<i>Schinus terebinthifolius</i>) Singapore Daisy (<i>Sphagneticola trilobata</i>)	Open forest (Mixed Species) The aim for this area is to achieve open to sparse tree density to provide some shade to the public for recreational activities. Resultantly, the species selection has been made with the consideration for public risk. Integral to the urban design of Shoreline is the nominal 100 m wide open-space buffer between the shore (HAT) and residential and community precincts to minimise the incidence of biting insect within high activity areas. A number of native species commonly planted as street trees have been selected for this management area in accordance with the Vegetation Enhancement Strategy (RCC 2007) (Table 2). Preference should be given to tree species such as <i>Banksia integrifolia</i>, <i>Lophostemon confertus</i>, <i>Cupaniopsis anacardioides</i>, <i>Hibiscus tiliaceus</i>, and <i>Buckinghamia celsissima</i> throughout the Foreshore Open Space to provide shade and link up patches of vegetation to facilitate wildlife movement. In areas that do not pose a risk to public or interfere with visual amenity, additional Koala food trees will be planted to facilitate safe movement opportunities between retained vegetated patches.

Table 2a. Foreshore Open Space Area recommended species planting list for public space areas with mown grass. Planting densities will be dependent on final development plans.

Scientific Name	Common Name	Form
<i>Banksia robur</i>	Swamp Banksia	Shrub
<i>Allocasuarina littoralis</i>	Black She-oak	Tree
<i>Angophora woodsiana</i>	Smudgee	Tree
<i>Banksia integrifolia</i>	Coastal Banksia	Tree
<i>Buckinghamia celsissima</i>	Ivory Curl	Tree
<i>Casuarina equisetifolia</i>	Coastal She-oak	Tree
<i>Cupaniopsis anacardioides</i>	Broad leaved Tuckeroo	Tree
<i>Hibiscus tiliaceus</i>	Cottonwood	Tree

Table 2b. Foreshore Open Space Area recommended species planting list for edges of Conservation Area and retained bushland patches.

Scientific Name	Common Name	Form	Density per square metre
<i>Ottocloa gracillima</i>	Slender Shade Grass	Grass	4
<i>Themeda triandra</i>	Kangaroo Grass	Grass	
<i>Entolasia marginata</i>		Grass	
<i>Imperata cylindrica</i>	Bladey Grass	Grass	
<i>Acacia fimbriata</i>	Eprapah Wattle	Shrub	One per 5 sqm
<i>Dodonaea triquetra</i>	Forest Hop Bush	Shrub	
<i>Melaleuca pachyphylla</i>	Wallum Bottlebrush	Shrub	
<i>Leptospermum polygalifolium</i>	Wild May	Shrub	

Table 3. Open Space Corridor Area Management Intent

	Major Weeds Present	Goal for Management Area
Management Area: Open Space Corridors General Comments: A large proportion of the Open Space Areas is currently characterised by open paddock with plans for future revegetation. Open Space Corridors will be managed to reduce the incidence of biting insects near residential and high activity precincts. Specially, the intention for this management area is to provide a mosaic of (mown) grass as ground cover, with sparse plantings of tall koala food trees within the outer 25 m edges, with the inner 50 m (or as otherwise approved by Council) core habitat being more densely planted and including midstorey (native shrubs) within the central portions and waterways. Tables 4a, b, c and d provide the recommended species and densities for the different management zones within the open space corridors.	Camphor Laurel (<i>Cinnamomum camphora</i>) Lantana (<i>Lantana camara</i>) Brazilian Pepper (<i>Schinus terebinthifolius</i>) Slash Pines (<i>Pinus elliotii</i>) Guinea Grass (<i>Megathyrus maximus</i>)	The main objective for this management area is to connect existing patches of vegetation to large tracts of vegetation to the west. The revegetation layout within Open Space Corridors will be designed so that areas immediately adjacent to residential precincts will support 35 m wide sparsely vegetated open-space. Adjoining road frontage and verges will achieve a buffer width well in excess of 50 metres to residential dwellings. Revegetation species will include tall tree species such as <i>Eucalyptus tereticornis</i>, <i>Eucalyptus robusta</i>, <i>Eucalyptus seeana</i>, <i>Eucalyptus siderophloia</i>, <i>Lophostemon suaveolens</i>, <i>Corymbia intermedia</i> and <i>Melaleuca quinquenervia</i>. Smaller trees may also be planted in clumps near within the central portions of the corridors and near the waterways. The vegetation will be planted in a mosaic pattern to allow breezeways to minimise biting insect connectivity. Some sedge species such as <i>Gahnia aspera</i> and <i>Juncus usitatus</i> may be planted closer to the edge of the stormwater retention areas as per BCC's (2005) WSUD draft planting list (Appendix 4). For areas prone to erosion, soil stabilising species such as <i>Lomandra sp.</i>, <i>Dianella sp.</i>, and <i>Themeda triandra</i> will be planted. In some areas, it may be necessary to use coir matting to prevent soil erosion.

Table 4a. Open Space Corridor Areas Recommended species planting list for **Riparian areas**

Scientific Name	Common Name	Form	Density per square metre
<i>Gahnia aspera</i>	Red Fruited Sawsedge	Sedge	1
<i>Geitonoplesium cymosum</i>	Scrambling Lily	Herb	
<i>Dianella caerulea</i>		Tufted	
<i>Dianella longifolia</i>		Tufted	2
<i>Lomandra hystrix</i>		Tufted	
<i>Lomandra longifolia</i>	Mat Rush	Tufted	
<i>Patersonia sericea</i>	Native Iris	Herb	
<i>Cayratia clematidea</i>	Slender Grape	Vine	
<i>Entolasia marginata</i>		Grass	4
<i>Oplismenus aemulus</i>	Australian Basket Grass	Grass	
<i>Oplismenus hirtellus</i>	Rainforest Beard Grass	Grass	
<i>Ottochloa gracillima</i>	Slender Shade Grass	Grass	
<i>Themeda triandra</i>	Kangaroo Grass	Grass	
<i>Juncus usitatus</i>	Common Rush	Sedge	
<i>Pseuderanthemum variable</i>	Love Flower	Herb	
<i>Leptospermum polygalifolium</i>	Wild May	Shrub/small tree	one per 5 sqm
<i>Malabathricum affine</i>	Native Lasiandra	Shrub	
<i>Melaleuca linariifolia</i>	Snow in Summer	Shrub	
<i>Melaleuca thymifolia</i>	Thyme Honey Myrtle	Shrub	
<i>Acacia leiocalyx</i>	Early Black Wattle	Shrub/small tree	
<i>Allocasuarina littoralis</i>	Black She-oak	Tree	
<i>Alphitonia excelsa</i>	Red Ash	Tree	
<i>Corymbia intermedia</i>	Pink Bloodwood	Tree	
<i>Eucalyptus seeana</i>	Fine-leaved Red Gum	Tree	
<i>Eucalyptus siderophloia</i>	Grey Ironbark	Tree	
<i>Eucalyptus tereticornis</i>	Blue Gum	Tree	one per 10 sqm
<i>Ficus coronata</i>	Creek Sandpaper Fig	Tree	
<i>Glochidion sumatranum</i>	Button Wood	Tree	
<i>Jagera pseudorhus</i>	Foam Bark	Tree	
<i>Lophostemon suaveolens</i>	Brush Box	Tree	
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Tree	
<i>Melicope elleryana</i>	Pink Euodia	Tree	
<i>Elaeocarpus obovatus</i>		Tree	

Table 4b. Open Space Corridor Areas Recommended species planting list for **Outer Corridor**

Scientific Name	Common Name	Form	Density per square metre
<i>Patersonia sericea</i>	Native Iris	Herb	2
<i>Dianella caerulea</i>		Tufted	
<i>Dianella longifolia</i>		Tufted	
<i>Lomandra hystrix</i>		Tufted	
<i>Themeda triandra</i>	Kangaroo Grass	Grass	4
<i>Entolasia marginata</i>		Grass	
<i>Ottochloa gracillima</i>	Slender Shade Grass	Grass	
<i>Eucalyptus seeana</i>	Fine-leaved Red Gum	Tree	one per 20 sqm
<i>Eucalyptus siderophloia</i>	Grey Ironbark	Tree	
<i>Eucalyptus tereticornis</i>	Blue Gum	Tree	
<i>Lophostemon suaveolens</i>	Brush Box	Tree	
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Tree	

Table 4c. Open Space Corridor Areas Recommended species planting list for **Non-riparian areas**

Scientific Name	Common Name	Form	Density per square metre
<i>Hovea linearis</i>		Shrub	1
<i>Eustrephus latifolius</i>	Wombat Berry	Vine	
<i>Geitonoplesium cymosum</i>	Scrambling Lily	Herb	
<i>Hibbertia scandens</i>		Vine	
<i>Cymbopogon refractus</i>	Barb Wire Grass	Grass	
<i>Dianella caerulea</i>		Tufted	2
<i>Dianella longifolia</i>		Tufted	
<i>Lomandra hystrix</i>		Tufted	
<i>Lomandra longifolia</i>	Mat Rush	Tufted	
<i>Patersonia sericea</i>	Native Iris	Herb	4
<i>Cayratia clematidea</i>	Slender Grape	Herb	
<i>Entolasia stricta</i>	Wiry Panic	Grass	
<i>Ottochloa gracillima</i>	Slender Shade Grass	Grass	
<i>Themeda triandra</i>	Kangaroo Grass	Grass	one per 5 sqm
<i>Acacia disparrima</i> subsp. <i>disparrima</i>	Hickory Wattle	Shrub/small tree	
<i>Acacia leiocalyx</i>	Early Black Wattle	Shrub/small tree	
<i>Boronia rosmarinifolia</i>	Forest Boronia	Shrub	
<i>Daviesia villifera</i>		Shrub	
<i>Gompholobium latifolium</i>	Golden Glory Pea	Shrub	
<i>Hakea florulenta</i>	Hakea	Shrub/small tree	
<i>Jacksonia scoparia</i>	Dogwood	Shrub/small tree	
<i>Leptospermum polygalifolium</i>	Wild May	Shrub/small tree	
<i>Leucopogon juniperinus</i>	Prickley Heath	Shrub	
<i>Monotoca scoparia</i>	Prickly Broom Heath	Shrub	
<i>Pultenaea myrtoidea</i>		Shrub	
<i>Dodonaea triquetra</i>	Forest Hop Bush	Shrub	
<i>Exocarpos cupressiformis</i>	Native Cherry	Shrub/small tree	
<i>Podolobium ilicifolium</i>	Holly-leaved Pea	Shrub	
<i>Pultenaea villosa</i>	Hairy Bush Pea	Shrub	
<i>Allocasuarina littoralis</i>	Black She-oak	Tree	
<i>Alphitonia excelsa</i>	Red Ash	Tree	
<i>Angophora leiocarpa</i>	Smooth Barked Apple	Tree	
<i>Angophora woodsiana</i>	Smudgee	Tree	
<i>Banksia integrifolia</i>	Coastal Banksia	Tree	
<i>Corymbia citriodora</i>	Spotted Gum	Tree	
<i>Corymbia gummifera</i>	Red Bloodwood	Tree	
<i>Corymbia trachyphloia</i>	Brown Bloodwood	Tree	
<i>Eucalyptus acmenoides</i>	White Mahogany	Tree	
<i>Eucalyptus siderophloia</i>	Ironbark	Tree	
<i>Eucalyptus tereticornis</i>	Blue Gum	Tree	
<i>Lophostemon confertus</i>	Brush Box	Tree	
<i>Lophostemon suaveolens</i>	Swamp Box	Tree	
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Tree	one per 10 sqm

Table 4c. Open Space Corridor Areas Recommended species planting list for **Bioretention basins**

Species	Common Name	Form	Density per square metre
<i>Carex appressa</i>	Tall sedge	Sedge	6 to 8
<i>Ficinia nodosa</i>	Knobby club-sedge	Sedge	
<i>Lepidosperma laterale</i>	Variable sword-sedge	Sedge	

Species	Common Name	Form	Density per square metre
<i>Lomandra hystrix</i>	River mat-rush	Herb	
<i>Lomandra longifolia</i>	Spiny -headed mat-rush	Herb	
<i>Poa labillardierei</i>	Common tussock grass	Grass	
<i>Themeda australis</i>	Kangaroo grass	Grass	
<i>Melaleuca thymifolia</i>	Thyme honey myrtle	Shrub	one per 5 sqm
<i>Callistemon sieberi</i>	River bottlebrush	Shrub/small tree	one per 10 sqm
<i>Banksia robur</i>	Swamp banksia	Shrub/small tree	
<i>Melaleuca linariifolia</i>	Flax-leaved paperbark	Tree	

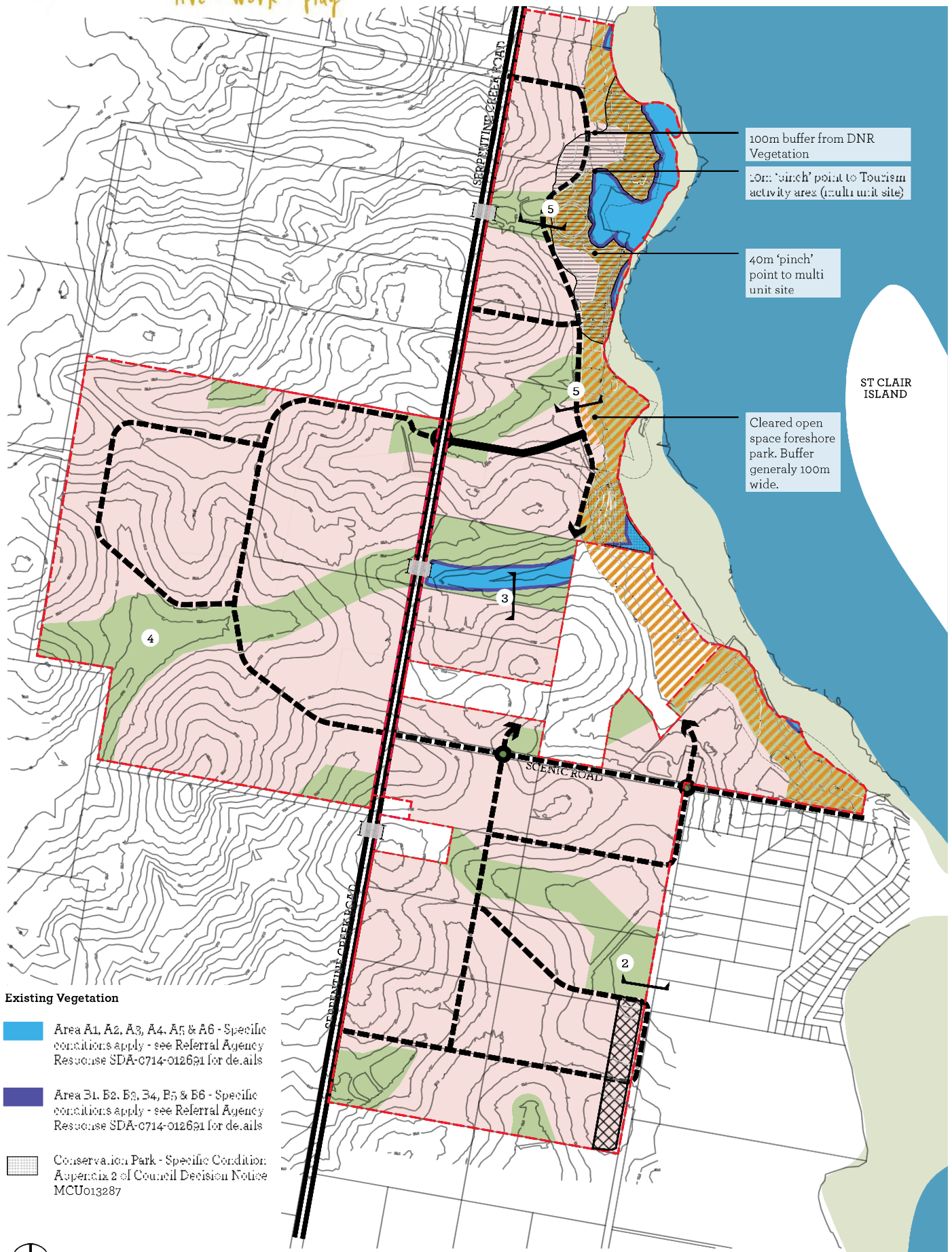
Table 5. Conservation Area Management Intent

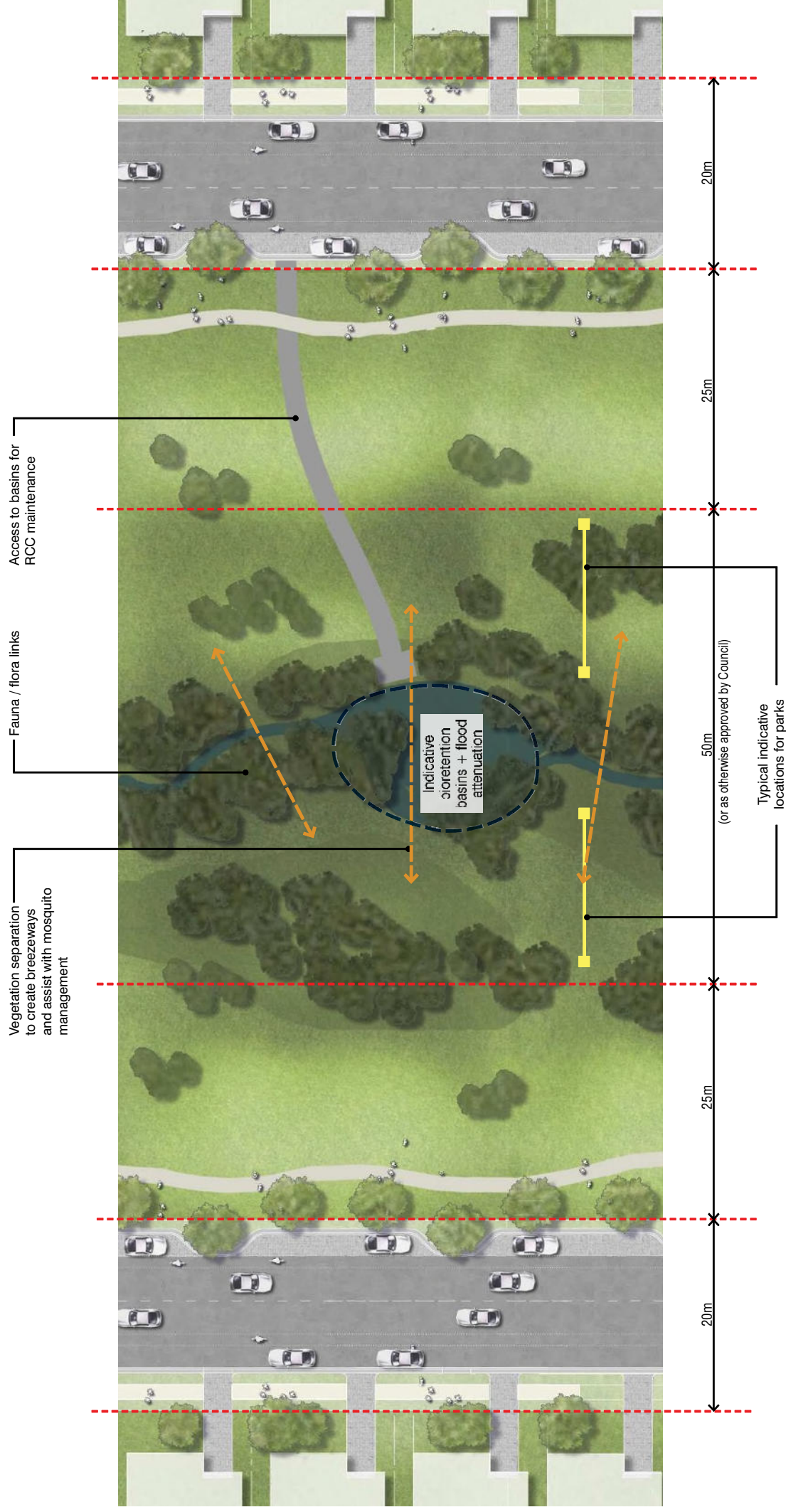
Management Area: Conservation Areas	Major Weeds Present	Goal for Management Area
General Comments: The two Conservation Areas are currently mapped as RE12.3.5/12.3.6. The main objective of management for these areas is to minimise the intrusion of weed species into the interior of the existing vegetation community. The perimeters of these Conservation Areas currently support a dense cover of weeds; therefore the edges will be revegetated with native species characterised by dense foliage (Table 6).	Lantana <i>Lantana camara</i> Ochna <i>Ochna serrulata</i> Camphor Laurel Cinnamomum <i>camphora</i> Brazilian Pepper <i>Schinus terebinthifolius</i> Umbrella Tree <i>Schefflera actinophylla</i>	The goal for these management areas is to maintain current conservation values and minimise the effects of weed intrusion into the interior of the Conversation Area. An edge-seal planting of native species with dense foliage is proposed to be planted around the perimeter of these management areas, with native grasses forming the ground cover on the edges. The removal of existing weed infestations within Conservation Areas is expected to improve current condition of native vegetation.

Table 6. Conservation Area Recommended species planting list for edges of Conservation Areas.

Scientific Name	Common Name	Form	Density per square metre
<i>Themeda triandra</i>	Kangaroo Grass	Grass	1
<i>Acacia fimbriata</i>	Eprapah Wattle	Shrub	One per 2 sqm
<i>Breynia oblongifolia</i>	Coffee Bush	Shrub	
<i>Dodonaea triquetra</i>	Forest Hop Bush	Shrub	
<i>Leptospermum polygalifolium</i>	Wild May	Shrub	
<i>Melaleuca linariifolia</i>	Snow in Summer	Shrub	
<i>Acmena smithii</i>	Lilipilli	Tree	
<i>Allocasuarina littoralis</i>	Black She-oak	Tree	
<i>Alphitonia excelsa</i>	Red Ash	Tree	
<i>Hovea linearis</i>	Foam Tree	Tree	
<i>Dianella caerulea</i>		Tufted	1
<i>Dianella longifolia</i>		Tufted	
<i>Lomandra hystrix</i>		Tufted	
<i>Lomandra longifolia</i>	Mat Rush	Tufted	
<i>Lomandra multiflora</i>		Tufted	
<i>Cissus hypoglauca</i>	Native Grape	Vine	
<i>Eustrephus australis</i>	Wombat Berry	Vine	
<i>Geitonoplesium cymosum</i>	Scrambling Lilly	Vine	

APPENDIX 2
**Indicative cross sections for vegetation
management within Open Space areas**





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NOTE: The location of the sports facilities does not form part of this approval.



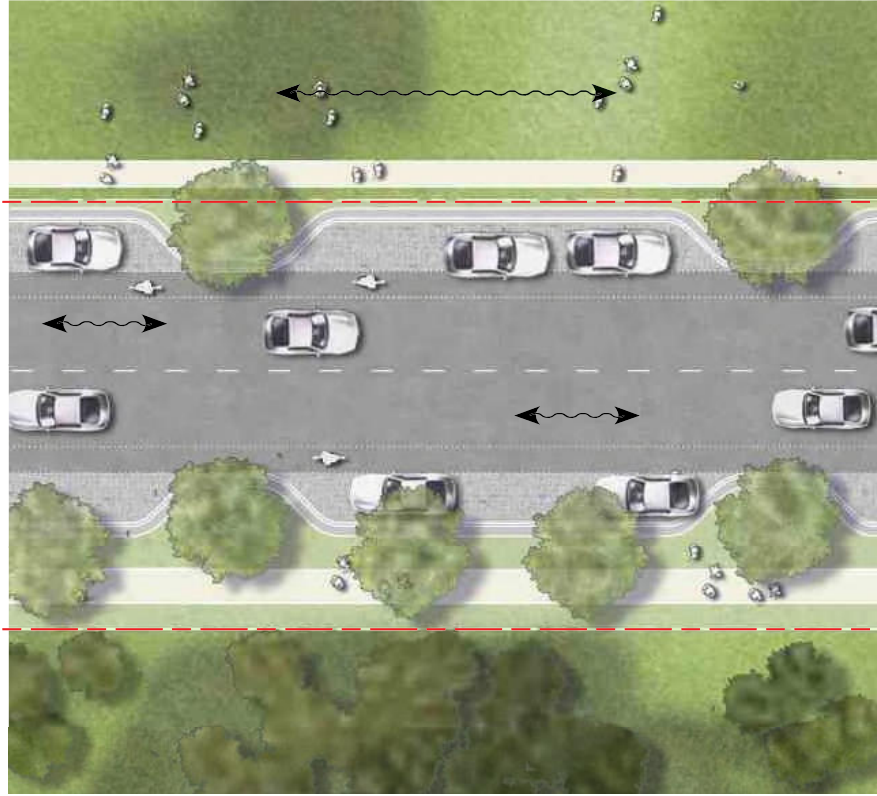
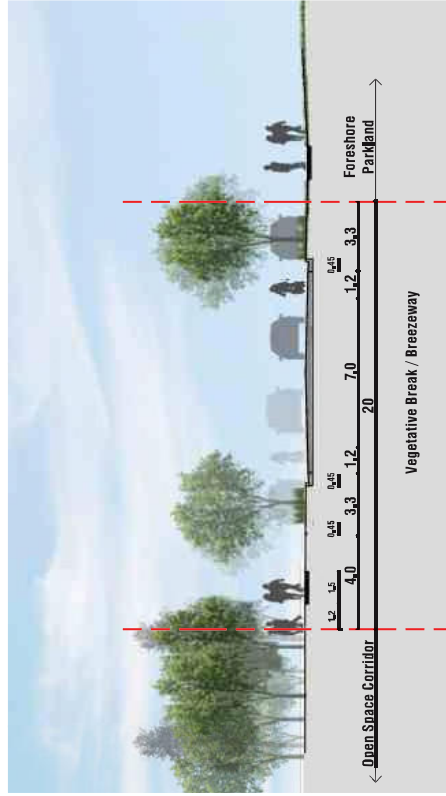
VEGETATION SEPARATION TO CREATE BREEZEWAYS FOR MOSQUITO MANAGEMENT

Open Space Multipurpose Corridor (Indicative Only).
Cross Section 4

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www.lat27.com.au

Esplanade Collector Street -
No Development Frontage

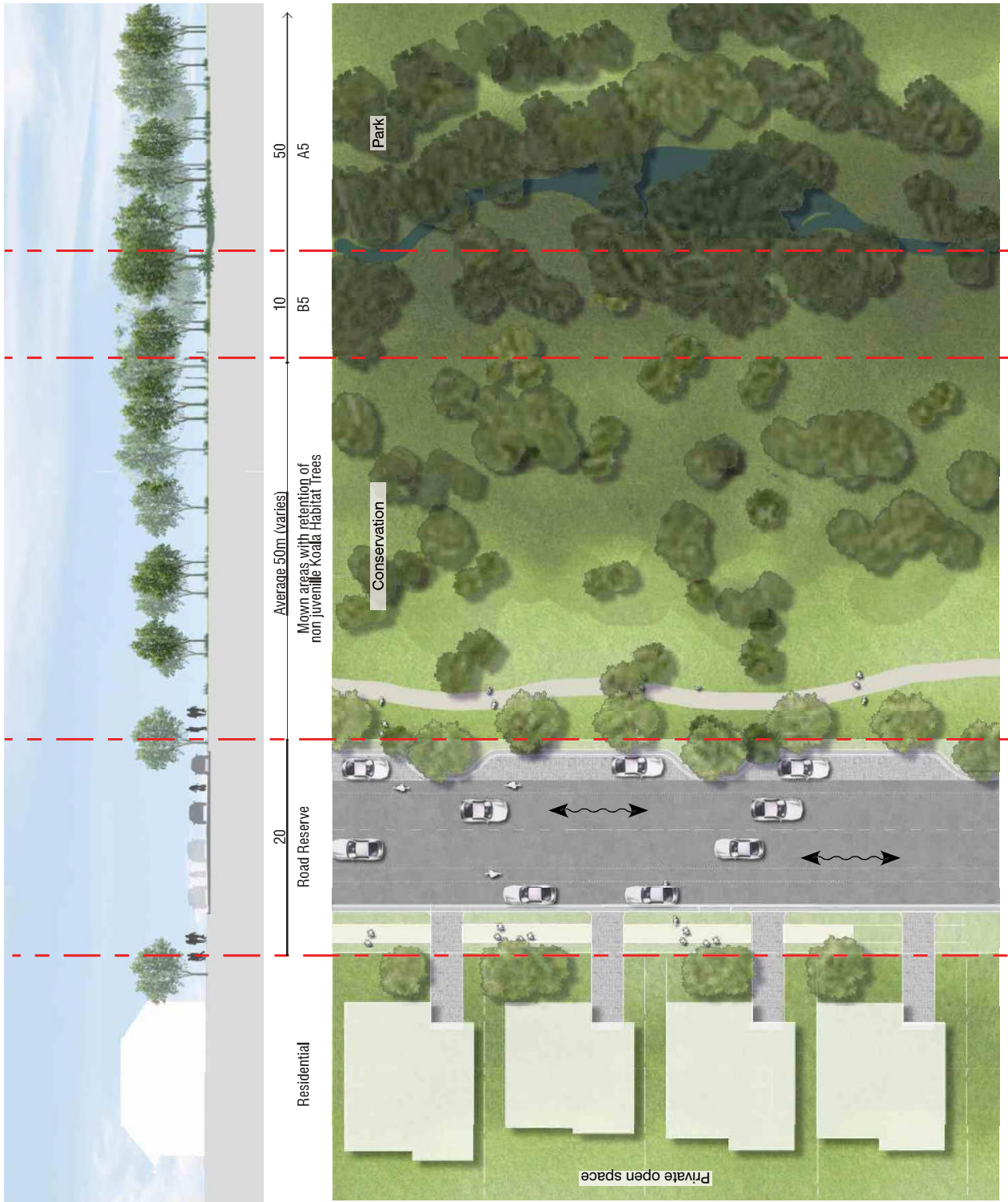
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(30m Nominal)
Vegetation Corridor

VEGETATION SEPARATION TO
CREATE BREEZEWAYS FOR
MOSQUITO MANAGEMENT

Open Space Corridors (Indicative Only)
Cross Section 5.0



VEGETATION SEPARATION TO CREATE
BREEZEWAYS FOR MOSQUITO MANAGEMENT

Development Adjacent to Conservation Park (Indicative Only)
Cross Section 3.0

APPENDIX 3

Weed Species Profile and Management

Broad-leaved Pepper (*Schinus terebinthifolius*)



Status: Declared as a **class 3 pest** under the provisions of the LP Act.

Description: This species is a small tree approximating 4.5 m wide and 6 m in height with leathery fern-like leaves. There are separate male and female trees. Small white flowers on the female trees are followed by bright red fruits which are dispersed by birds (Australian Weeds Committee 2009c). When crushed, leaves emit a peppery aroma. Fruit are produced in winter.

Distribution and Habitat: This exotic species has naturalised in New South Wales, Western Australia and Queensland and is particularly abundant in coastal and urban areas.

Threats: This species harbours a disease that can kill mangroves and it chokes out native plants. It also contains toxic resins that can affect human and animal health (Jordan 2008e).

Recommended Treatment: The Basal Bark method is suitable for this thin-barked woody tree. It is recommended that 21 ml of 'Starane Advanced' mixed in 1L of diesel should be sprayed around the full circumference of the trunk or stem. However, in areas where native vegetation is growing close to the trunk, it may be preferable to use the *cut-stump swabbing* method using the same concentration of 'Starane Advanced'. In newly established smaller plants foliar spray using 3mL 'Starane Advanced' mixed with 1 L water is successful in killing young plants (T & C Armstrong 2009)

RCC uses the Basal Bark method with (Starane 200) 350mL/10L Diesel.

NOTE: This plant may be mulched if not in seed. However, any portions containing seeds must be removed from site to prevent re-establishment of the species.

Lantana Bush (*Lantana camara*)



Status: Declared as a **class 3 pest** under the provisions of the LP Act.

Description: A variable sprawling thicket-forming perennial shrub to 5 m high and many metres wide or climbing to 15 m high. Leaves mostly to 7 cm long and to 4 cm wide and arranged in opposite pairs. Leaf margins are toothed and their leaf surface is covered with fine hairs. Leaves are aromatic and emit an unpleasant odour when crushed. Fruit green at first, ripening to black. Each fruit contains a single seed (Australian Weeds Committee 2009b).

Distribution and Habitat: This species covers over 4 million hectares throughout most coastal and sub-coastal areas of eastern Australia, from North Queensland to southern New South Wales and has spread into the Northern Territory and Western Australia. This species also has the potential to invade Victoria. Lantana grows in a wide variety of habitats, from exposed dry hillsides to wet, heavily shaded gullies (Jordan 2009c).

Impacts: Plants smother vegetation to 15 m tall. Leaves and seeds of some varieties are toxic to stock, causing photosensitisation and damage to liver, kidneys and gut. Lantana infests over 4 million hectares of pasture and many millions of hectares of open woodland and open forest in Australia (Australian Weeds Committee 2009b).

Recommended Treatment

Individual plants can be foliar spot sprayed using 'Starane' 500mL/100L water. Extensive infestations can be treated with the cut stump and swab or basal bark spray method during the peak growing season. With large plant specimens use a concentration of 'Starane' 1000mL / 100L water as mechanical removal such as grubbing can cause excessive soil disturbance, which is undesirable.

NOTE: *Fruit of this species must be removed from site to prevent re-infestation. If manually removed, all vegetation material (particularly parts containing roots must be removed from site to prevent re-infestation).*

Singapore Daisy (*Sphagneticola trilobata*)



Status: Declared as a **class 3 pest** under the provisions of the LP Act.

Description: This is a mat-forming perennial herb, growing to 70 cm in high with prostrate stems that grow to 2 m or more in length. Leaves approximate 3 to 11 cm long and 2.5 to 8 cm wide and are dark green above, paler below, with simple white hairs. Leaf margins are toothed. Roots are often present at the nodes. Flowers approximate 3.5 cm in width and are yellow (Australian Weeds Committee (2009d)).

Distribution and Habitat: This is an exotic species native to south America and was introduced to Australia as a garden ornamental. Since its introduction, it has become naturalised and has spread by cuttings and seeds (Jordan 2007e).

Threats: This species invades environmental areas where it spreads rapidly and smothers seedlings, ferns and shrubs (Jordan 2007e).

Recommended Treatment: Foliar spray is effective using 10 g Metsulfuron-methyl with 100 ml 'BS1000' per 100 litres of water (T & C Armstrong 2009)

NOTE: If manually removed, all portions of this plant must be removed from site as there is the risk that re-establishment may result from small fragments.

Ochna (*Ochna serrulata*)



Status: This species has not been declared as a pest under the provisions of the LP Act.

Description: This species consists of a shrub which grows to a height of approximately 2–3 m. Leaves are oblong to narrow-elliptic and are 2–6 cm long and 7–15 mm wide. Leaf margins are toothed, often undulate and the leaves have a short petiole. Leaves are a deep green in colour.

Flowers are produced from leaf axils and are sulphur yellow in colour. Fruit are in the form of a drupe, which is ovoid, 5–8 mm long, black and is embedded on the swollen red receptacle (Harden 2009). Flowers are produced in the spring, followed by summer fruiting.

Distribution and Habitat: A native of South Africa, this species was introduced as an ornamental garden species from where it has since escaped. The species has naturalised within coastal areas of New South Wales and Queensland (Harden 2009).

Impacts: Invades areas of remnant vegetation on suitable soils and is an aggressive invader which significantly displaces native understorey species.

Recommended Treatment: Where infestations form a monoculture, foliar spraying with 200 ml of 'Glyphosate 360' with 10 L of water is most efficient and preferable. Application of undiluted Picloram (i.e. trade name Vigilant ®) via the cut stump or the stem injection method should be used.

NOTE: This plant is not to be mulched if in seed as it will result in re-infestation of the site.

Green Panic (*Megathyrsus maximus*)



Status: This species has not been declared as a pest under the provisions of the LP Act, however can become invasive.

Description: This is a perennial grass species which grows to a height of 3 m. Leaves are slightly hairy. Flowers are presented in a panicle approximating 15–50 cm long. The spikelets are subobtusely to acute and are approximately 2.5–4 mm in length and are slightly hairy (Jacobs and Wall 2009).

Distribution and Habitat: A native of Africa, this species was introduced for pasture improvement. The species has now naturalised in pastures and road sides in New South Wales, particularly within coastal areas. It also occurs in the Northern Territory and Queensland (Jacobs and Wall 2009).

Impacts: Invades areas of disturbed remnant vegetation on suitable soils, roadsides and cane-growing areas, is an aggressive invader which significantly displaces native.

Recommended Treatment: Where infestation forms a monoculture or is co-dominant with other exotic grass species and is easily accessible, foliar spraying with 500 ml of 'Glyphosate 360' with 1 L water is most efficient and preferable. Individual plants mixed with native grass or forb species can be carefully removed by pulling or chipping.

NOTE: *This plant is not to be mulched if in seed as it will result in re-infestation of the site.*

Camphor Laurel (*Cinnamomum camphora*)



Source: Brisbane City Council



Source: Save Our Waterways Now (SOWN)

Status: This species is declared as a class 3 pest under the provisions of the LP Act.

Description: Camphor laurel is a large evergreen tree, growing up to 20 m tall. The leaves have a glossy, waxy appearance and smell of camphor when crushed. In spring it produces lush, bright-green foliage and masses of small white flowers. The spherical fruits are green (changing to black when ripe) and 10 mm in diameter.

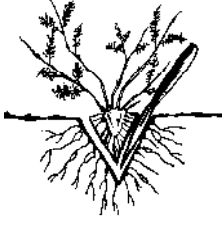
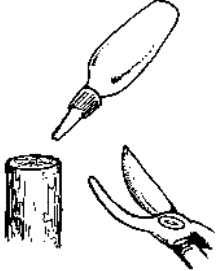
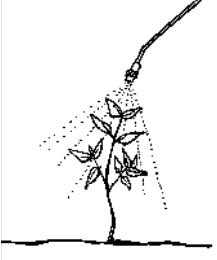
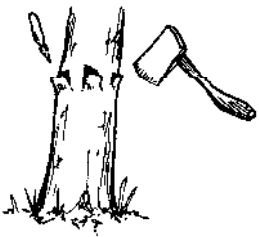
Distribution and Habitat: A native of Eastern Asia, this species was introduced as an ornamental garden species throughout Queensland (DAFF 2013).

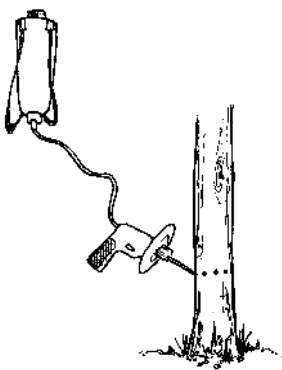
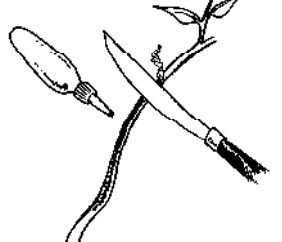
Impacts: Invades pastures and disturbed riparian systems, often germinating under fences and power lines (where birds rest and deposit the seeds). As a result, it can push fences over and disrupt power facilities (DAFF 2013).

Recommended Treatment: Selection of a suitable control method depends on the size of the target tree and its situation. Foliar spray can be applied for young trees to 3 m tall with Triclopyr as Butoxyethyl ester + Picloram (1:20 Water). For trees up to 6 m, carefully spray Triclopyr as Butoxyethyl ester (around the base of each stem or trunk to a height of 40 cm above the ground, making sure every part of the trunk is sprayed). For trees taller than 6 m, stem injection at regular intervals under the bark to penetrate the sapwood with Glyphosate as propylamine salt (2ml of 1:1 mix with water) (DAFF 2013).

APPENDIX 4

Weed Control Techniques

	Hand Removal Removal of small weeds by hand. To be employed for weeds where the entire root system can be easily removed by hand whilst minimising soil disturbance. Care is necessary to ensure seed is not disbursed. Plants likely to restrike (e.g. Asparagus Fern) or set propagules should be removed from site.
	Crown or underground stem removal Employed for plants growing from a solid central crown below ground level such as Asparagus Fern: ▪ a blade is used to sever the roots from the central crown; ▪ severing the attached roots and removing the crown or underground stem with the plant; ▪ seed heads should be removed prior to crowning. Cut material and seeds are to be removed from site.
	Cut stump method This method is ideal for woody plants and vines without aerial tubers: ▪ cut the stem close to the ground, if possible below the lowest branch; ▪ immediately (with 30 seconds) apply herbicide using a small squeeze bottle to the cut surface; ▪ Generally 1 part Glyphosate to 1.5 parts of water is suitable to achieve a kill with most species. Cut material will be left on site, except where, in the judgement of the Contractor the material is likely to restrike (e.g. Singapore Daisy) or set propagules. In this case material is to be transported as waste from the site and not incorporated in material to be mulched.
	Spraying Care must be undertaken to avoid drift by selecting appropriate nozzles, adjusting droplet size, spraying in low wind conditions and keeping the spray head close to the target plant. Boom spraying: Boom spraying may be useful in the preparation of broad grassy areas for planting bed preparation. Care will be necessary to avoid native species in these areas. It may be necessary to cross the site before spraying commences and identify the location of individual plants by flagging tape or stakes. Spot spraying: Undertaken manually with a knapsack or motorised spray unit. Knapsack foliar spraying will be employed for the preparation of planting areas, the selective target of individual weeds in planting beds or regeneration areas as part of bush regeneration and part of on-going maintenance.
	Chipping method Employed for trees and shrubs to be left <i>in situ</i> to naturally decay: ▪ shallow cuts are made just under the bark into the living tissue with a small axe as close to the ground below the lowest branch; ▪ herbicide applied with a squeeze bottle immediately (within 30 seconds) into the exposed cut surface; ▪ continue cuts around the trunk at the same level, with 5cm gaps between each cut; ▪ Generally 1 part Glyphosate to 1.5 parts of water is suitable to achieve a kill with most species. Generally standing trees are left to rot <i>in situ</i>. However, once senescent, it may be appropriate to fell the tree (without causing damage to regeneration) if the tree poses a safety hazard or significantly reduces site amenity.

	Tree injection Employed for trees and shrubs to be left <i>in situ</i> to naturally decay: ▪ holes are drilled at a downward angle into the tree's sapwood at 5cm spaces; ▪ if a "Side Winder" or similar device is not employed herbicide is then applied immediately (within 30 seconds) into each hole small with a squeeze bottle; ▪ Best results are achieved with plants, which are actively growing; ▪ Generally 1 part Glyphosate to 1.5 parts of water is suitable to achieve a kill with most species. Generally standing trees are generally left to rot <i>in situ</i>. However, once senescent, it may be appropriate to fell the tree (without causing damage to regeneration) if the tree poses a safety hazard or significantly reduces site amenity.
	Scraping the stem method This method is used for plants with aerial tubers, such as Madeira Vine. ▪ a sharp knife is employed to lightly scrape a section of stem (approximately 10cm) removing bark and exposing the living tissue; ▪ apply herbicide immediately (within 30 seconds) to the exposed section with a small squeeze bottle; ▪ Generally 1 part Glyphosate to 1.5 parts of water is suitable to achieve a kill with most species.

APPENDIX 5

Water Sensitive Urban Design Planting List



Table 12.1: Plant species list for swales and buffer strips, bioretention swales and bioretention basins

Scientific Name	Common Name	Form	Height (mm)	Planting Density (Qty/m ²)	Comments
<i>Cynodon dactylon</i>	Couch	Turf	50-150	Seeded or rolled	Mowing required to achieve smaller heights
<i>Digitaria didactyla</i>	Blue Couch	Turf	50-150	Seeded or rolled	Mowing required to achieve smaller heights
<i>Paspalum distichum</i>	Water Couch	Turf	To 500	Seeded or rolled	Not suitable for sandy soils with low water holding capacity
<i>Paspalum vaginatum</i> cv 'Saltene'	Salt Water Couch	Turf	To 500	Seeded or rolled	Salt tolerant
<i>Sporobolus virginicus</i>	Marine Couch	Turf	To 400	Seeded or rolled	Salt tolerant
<i>Stenotaphrum secundatum</i>	Buffalo	Turf	50-150	Seeded or rolled	Mowing required to achieve smaller heights
<i>Bacopa monnieri</i>	Bacopa	Prostrate	100	6-8	Not suitable for sandy soils with low water holding capacity
<i>Myoporum parvifolium</i>	Creeping Boobialla	Prostrate	150	4-6	
<i>Baumea teretifolia</i>		Tufted	300-1000	6-8	Not suitable for sandy soils with low water holding capacity
<i>Carex appressa</i>	Tall Sedge	Tufted	1000	6-8	Not suitable for sandy soils with low water holding capacity
<i>Carex fascicularis</i>	Tassel Sedge	Tufted	1000	6-8	Not suitable for sandy soils with low water holding capacity
<i>Carex gaudichaudiana</i>	Tufted Sedge	Tufted	600	6-8	Not suitable for sandy soils with low water holding capacity
<i>Carex polyantha</i>	Creek Sedge	Tufted	To 900	6-8	Not suitable for sandy soils with low water holding capacity
<i>Carex pumila</i>	Coastal Sedge	Tufted	250	8-10	Salt tolerant
<i>Cymbopogon refractus</i>	Barbed Wire Grass	Tufted	300	8-10	
<i>Cyperus gunnii</i>	Fleeced Flat-sedge	Tufted	1000	6-8	Not suitable for sandy soils with low water holding capacity
<i>Cyperus polystachyos</i>	Bunchy Sedge	Tufted	600	6-8	
<i>Dianella brevipedunculata</i>	Flax Lily	Tufted	500	4-6	
<i>Dianella caerulea</i> cv 'Breeze'	Blue Flax-lily	Tufted	600	4-6	
<i>Dianella caerulea</i> cv 'Little Jess'	Blue Flax-lily	Tufted	400	4-6	Shade tolerant
<i>Dianella longifolia</i> var. <i>longifolia</i>	Pale Flax-lily	Tufted	300-800	6-8	Shade tolerant

¹ Planting density indicates the mean number of plants per square metre for the species spatial distribution within the zone. The planting densities recommended are suggested minimums. Any reduction in planting density has the potential to reduce the rate of vegetation establishment, increase the risk of weed invasion, and increase maintenance costs.



Scientific Name	Common Name	Form	Height (mm)	Planting Density (Qty/m ²)	Comments
<i>Dianella tasmanica</i>	Tasman Flax-lily	Tufted	1500	4-6	Shade tolerant
<i>Dichelachne crinita</i>	Long Haired Plume Grass	Tufted	200	6-8	
<i>Dietes bicolor</i>	Dietes	Tufted	1000	4-6	Exotic
<i>Dietes grandiflora</i>	Dietes	Tufted	750	4-6	Exotic
<i>Erograstis elongata</i> cv 'Elvera'	Elvera	Tufted	300	6-8	
<i>Gahnia aspera</i>	Saw Sedge	Tufted	1000	4-6	Not suitable for sandy soils with low water holding capacity
<i>Gahnia sieberiana</i>	Red-fruited Sword Sedge	Tufted	1500-3000	4-6	
<i>Imperata cylindrica</i>	Blady Grass	Tufted	500	6-8	
<i>Fimbristylis nodosa</i> (Syn. <i>Isolepis nodosa</i>)	Knobby Club Rush	Tufted	600	4-6	Salt tolerant, sandy conditions
<i>Juncus kraussii</i>	Sea Rush	Tufted	600-2300	8-10	Salt tolerant
<i>Juncus usitatus</i>	Common Rush	Tufted	500	8-10	Not suitable for sandy soils with low water holding capacity
<i>Lepidosperma laterale</i>	Variable Sword Sedge	Tufted	500-1000	6-8	Shade tolerant
<i>Liriope muscari</i> cv 'Evergreen Giant'	Turf Lily	Tufted	500	4-6	Exotic, shade tolerant
<i>Lomandra confertifolia</i> subsp <i>confertifolia</i>	Matting Lomandra	Tufted	300	4-6	Shade tolerant
<i>Lomandra confertifolia</i> subsp <i>pallida</i>	Mat Rush	Tufted	400	4-6	Shade tolerant
<i>Lomandra hystrix</i>	Creek Matt Rush	Tufted	1000	4-6	Shade tolerant, not suitable for sandy soils with low water holding capacity
<i>Lomandra longifolia</i>	Matt Rush	Tufted	1000	4-6	Shade tolerant
<i>Lomandra longifolia</i> cv 'Tanika'	Tanika	Tufted	500	4-6	Shade tolerant
<i>Pennisetum alopecuroides</i>	Swamp Foxtail	Tufted	1000	4-6	Shade tolerant, this plant is not invasive
<i>Pennisetum alopecuroides</i> cv 'Nafray'	Fountain Grass	Tufted	300-500	6-8	Sterile cultivar
<i>Poa labillardiere</i> cv 'Eskdale'	Eskdale	Tufted	450	6-8	
<i>Themeda australis</i>	Kangaroo Grass	Tufted	300-500	6-8	
<i>Themeda australis</i> cv 'Mingo'	Mingo	Tufted	200	8-10	

For trees and shrubs, refer to the 'Landscape Design Notes' section in the applicable WSUD element chapter.

APPENDIX 6
Water Sensitive Urban Design Preliminary
Advice