



**DRAFT**  
**ECOLOGICAL SITE MANAGEMENT STRATEGY**

**RIVERSIDE**  
**TEA GARDENS**

**NOVEMBER 2011**  
**(REF: 11118)**

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## PREFACE

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This Ecological Site Management Strategy (ESMS) has been prepared in draft form to provide a range of ecological management strategies in protecting the long term environmental and ecological values of lands within the proposed development for Riverside at Tea Gardens.

This report has been prepared to accompany an Environmental Assessment to be submitted as part of a development application for the "Riverside" lands known as Lots 10 and 34 DP 270100 Myall Road Tea Gardens. The Environmental Assessment has been prepared in accordance with the Director General's Environmental Assessment Requirements (DGEAR's). These DGEARs have been provided in accordance with Part 3A Major Infrastructure and Other Projects of the *Environmental Planning and Assessment Act* (1979).

The ESMS has been prepared to specifically address the following:

- Vegetation and Bushland Management;
- Bushfire Management;
- Fauna and Habitat Management;
- Provision and Establishment of Environmental Corridors;
- Provision of Environmental Buffers;
- Erosion and Sediment Control;
- Stormwater Quality and Management;
- Cultural Values and Management;
- Community Education, Vigilance and Reporting;
- Access, Signage and Fencing;
- Prohibited Use Identification and Management;
- Feral Pest Species;
- Monitoring and Reporting Regime.

This ESMS uses the site and local area information collected across a large number of studies in recommending suitable environmental management objectives and actions in the long term protection of the environmental values of the area proposed to be developed.

It should be noted that this is a "Draft" report which is required to be reconsidered during the preparation of a more detailed "offsetting package" which is to be considered and prepared following concept plan approval.

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Director

**Conacher Environmental Group**

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# SECTION 1

## INTRODUCTION AND BACKGROUND

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### 1.1 INTRODUCTION

This Draft Ecological Site Management Strategy (ESMS) has been completed to provide a range of environmental management strategies for protecting the long term environmental and ecological values of lands within the proposed development area and associated retained natural areas and biodiversity/vegetation off-set areas associated with the Riverside proposed development.

This report has been prepared to accompany an Environmental Assessment to be submitted as part of a development application for the Riverside site. The Environmental Assessment has been prepared in accordance with the Director Generals Environmental Assessment Requirements (DGEAR's). These DGEARs have been provided in accordance with Part 3A Major Infrastructure and Other Projects of the *Environmental Planning and Assessment Act* (1979).

*Conacher Environmental Group* have been engaged by *Crighton Properties* as proponents of the application for the development of Riverside to prepare this ESMS.

The land subject to the provisions of this ESMS consists of those areas bound by Lots 10 and 34, DP 270100 Myall Road, Tea Gardens and herein known as the Riverside site.

This Draft Ecological Site Management Strategy has been produced to a Draft standard on the basis that the final details on the location and extent of development has not been fully determined and therefore the full extent of the requirements of the ecological site management measures have not been finalised.

### 1.2 BACKGROUND

The Riverside development area is bound by Toonang Drive in the north, the Myall River in the east, Shearwater Estate in the south and Myall Road to the west. The Riverside site area is approximately 230 hectares in size.

The proposed development is for a mixed use commercial, industrial and residential development. According to the Concept Masterplan the proposal will include the following:

- Residential lot development as Community Title;
- Conference and Clubhouse facilities and low rise Townhouse accommodation;
- Low density "Lodge Houses" associated with Conference facilities;
- Wildlife movement corridors;
- Water management corridors;
- Open space corridors;
- Sporting ovals and tennis courts;
- Lake areas for water quality management;
- Public Reserve areas incorporating sporting ovals and tennis courts;
- Community parks incorporating walking trails, gazebo and other facilities.

The Masterplan design includes the retention of large areas of the site for the purposes of environmental protection. These areas include:

- SEPP 14 Wetlands;
- Conservation zoned lands;
- Asset Protection Zones and environmental buffers;
- Wildlife Corridors;
- Drainage Corridors;
- Open Space areas;
- Vegetation and biodiversity off-set areas.

The possible future ownership of these areas and the responsibility of management of these areas is outlined in Section C of this Strategy.

### **1.3 PROCEDURES FOR THE PREPARATION OF THE MANAGEMENT STRATEGY**

This ESMS has been prepared using information obtained from a range of sources including the following:

- Ecological Assessment Report for Riverside at Tea Gardens (Cumberland Ecology 2011);
- Local Environmental Study – Myall Quays (and related Supplementary Reports) (Gardner Browne Planning Consultants, Resource Planning, Patterson Britton and Partners 1991, 1992);
- Flora and Fauna Assessment Report – Myall Quays Estate (*Conacher Travers* 2002);
- Local Environmental Study – Myall River Downs (PPK Environment and Infrastructure 2000);
- Local Environmental Study – North Hawkes Nest (ERM Mitchell McCotter 1997);
- Species Impact Statement – Myall River Downs (*Conacher Travers* 2007);
- Recovery Plan – Hawkes Nest Tea Gardens Endangered Koala Population (Department of Environment and Conservation 2003);
- Ecological Studies of the Squirrel Glider Myall River Downs (D. Sharpe and R. Goldingay 2006);
- Draft Environmental Site Management Plan Rural Residential Subdivision Myall River Downs (*Conacher Travers* 2007).

This Ecological Site Management Strategy details the strategies and measures to be implemented in protecting the natural values of the post development landscape at Riverside at

Tea Gardens. In particular the Ecological Site Management Strategy provides information on the following:

- Vegetation and Bushland Management;
- Bushfire Management;
- Provision and Establishment of Environmental Corridors;
- Provision of biodiversity off-set areas;
- Provision of Environmental Buffers;
- Erosion and Sediment Control;
- Cultural Values and Management;
- Community Education, Vigilance and Reporting;
- Access, Signage and Fencing;
- Prohibited Use Identification and Management;
- Fauna and Fauna Habitat Management;
- Feral Pest Species;
- Monitoring and Reporting Regime.

Each of the above issues is addressed separately in Part B through the process outlined below:

- i) Identification of objectives to be achieved for each issue;
- ii) A statement of the proposed actions to be implemented to address each issue and the objectives provided;
- iii) More detailed information on methods, procedures or quantifying information supporting proposed actions is to be provided as operational or works plans prepared to meet the objectives and requirements identified in the strategy.

#### **1.4 AREA TO WHICH THIS MANAGEMENT STRATEGY APPLIES**

The area to which this Management Strategy applies is the area bound by the Concept Masterplan for the proposed development and known as Riverside at Tea Gardens. The area bound by the Masterplan is detailed in the Masterplan by ERM and is shown as Figure 1 of this Report.

#### **1.5 LIFESPAN AND REVIEW OF THE MANAGEMENT STRATEGY**

The ESMS will be implemented for ten years following the date of sign-off of the project by the Department of Planning. The plan will be reviewed at Year one, Year two and Year five to assess the adequacy of implementation of the management actions.

Those areas within the Riverside Masterplan area that are proposed to be managed under Community Title will have the management actions provided in this ESMS to be included in the Community Management Statement for the Community Title areas. However this will require a full review and amendment of the ESMS at the ten year period. This process may require individual management plans to be prepared to accompany individual Development Applications as part of the development staging process.

## 1.6 FORMAT OF THE MANAGEMENT STRATEGY

The overall Management Strategy is provided as a single document separated into several sections as outlined below.

### **SECTION 1 Introduction and Background**

Outlines the purpose/ objectives and procedures for preparing this Management Strategy.

### **SECTION 2 Management Objectives and Proposed Actions**

This part identifies the various management objectives and Management Actions to achieve the objectives of the Management Strategy.

### **SECTION 3 Implementation of Management Actions**

This part details how the Management Strategy will be implemented, who is responsible for implementing various actions and provides details on the monitoring and reporting for the life of this management strategy.

## 1.7 ENVIRONMENTAL MANAGEMENT OBJECTIVES

The environmental management objectives for the areas covered within this Management Strategy are:

- i) Protection of the environmental and ecological values of the retained and conserved areas of the site.
- ii) Minimisation of the impacts of development within adjacent land upon the retained vegetation and habitat areas during construction and occupation phases of adjoining residential areas.
- iii) Maintenance of biodiversity and protection of native flora and fauna species and their habitats (including threatened species) within the conservation and off-set areas.
- iv) Increased awareness and promotion of a culture of protection of the environmental values of the retained and conserved areas of the site by the community.
- v) Long term monitoring of the area to determine changes (if any) to flora and fauna, particularly threatened species, and vegetation communities and recommend corrective actions if required.

## 1.8 SITE DESCRIPTION

### **RIVERSIDE SITE**

#### **Landform Features**

##### *Topography and slopes*

The topography of the site consists predominantly of flat land of negligible slope and less than 5 metres AHD. In the north of the site a small ridge with a southerly aspect rises to approximately twenty metres.

##### *Drainage*

Drainage from the site is via overland flow and through small drainage channels into the Myall River. Areas of the site drain into SEPP 14 Wetland No. 746 on the shores Myall River in the east of the site.



### *Soils*

Three soil landscapes occur within the subject site. These are the Bobs Farm, Tea Gardens and Pindimar Road Soil Landscapes (Murphy 2002).

The majority of the site consists of soils of the Tea Gardens soil landscape. These soils are found in local relief usually less than 1 metre and elevation 5-8 metres. Soils consist of deep (<300 cm) imperfectly drained Humus Podzols on ridges with poorly drained Peaty Humus Podzols in swales. The soils are prone to seasonal and permanent waterlogging, ground water pollution hazards and are of very low fertility.

The soils associated with the upslope and ridge areas in the north of the site are within the Pindimar Road soil landscape. These soils are found locally on undulating to rolling hills to local relief 30-60m. Soils consist of Brown and Yellow Podzolic soils and Soloths in poorly drained areas. These soils are of low fertility and exhibit high erosion, strong acidity and seasonal waterlogging.

The north-western area of the site contains poorly drained clays and loam soils of the Bobs Farm soil landscape unit. A detailed Soils Assessment Report for the site (Whitehead and Associates 2011) has determined that the soil types present are not alluvial floodplain soils but are dominated by aeolian sand podzol soils.

### **Vegetation**

The subject site is bounded to the west by the Myall Road, disturbed grasslands with scattered trees, industrial and residential development; to the south, by predominately existing residential and commercial development; to the east, by the Myall River; and to the north, by a mixture of open forest vegetation communities, areas of rural residential development and agricultural lands.

The majority of the vegetation of the site forms a mosaic of highly disturbed vegetation with scattered trees and woodland/open forest communities. However, the eastern portion of the Riverside site is dominated by a remnant of naturally vegetated Swamp Forests, Heathlands and Estuarine vegetation communities associated with the low lying areas adjoining the Myall River. This remnant is largely isolated from adjoining vegetation to the south by existing residential development and to the north by an area of cleared agricultural land.

The northern boundary of the subject site is largely dominated by a mixture of open forest vegetation communities and areas of rural residential development. Connectivity exists between the sites eastern remnant vegetation and the areas of remnant open forest to the north, via a mosaic of disturbed woodland and open forest vegetation communities occupying the north eastern areas of the site. These vegetation communities have been impacted by a history of agricultural land use and grazing, resulting in a sparse understorey layer. Continued habitat fragmentation has also resulted from the development of the rural residential areas of Shearwater Estate to the north of the site.

### **Fauna**

Surveys within the subject site and the local area have recorded a range of fauna species. These fauna observations consisted of bird species, mammal species, frog species and reptile species.

During the fauna surveys of the subject site the following threatened fauna species were observed. These species are:

- Osprey (*Pandion haliaetus*);
- Barking Owl (*Ninox connivens*);
- Wallum Froglet (*Crinia tinnula*);
- Squirrel Glider (*Petaurus norfolcensis*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*).
- Little Bentwing-bat (*Miniopterus australis*);
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*);
- Greater Broad-nosed Bat (*Scoteanax rueppellii*);
- Large-footed Myotis (*Myotis adversus*);

A number of other threatened fauna species have been observed within the Tea Gardens area as the result of past local area surveys. These are:

- Black-necked Stork (*Ephippiorhynchus asiaticus*);
- Powerful Owl (*Ninox strenua*);
- Masked Owl (*Tyto novaehollandiae*);
- Koala (*Phascolarctos cinereus*);
- Eastern Chestnut Mouse (*Pseudomys gracilicaudatus*);
- Eastern Pygmy-possum (*Cercatetus nanus*);
- Eastern Blossom-bat (*Synconycterus australis*);
- Eastern Freetail-bat (*Mormopterus norfolkensis*).

## Habitats

A range of fauna habitats are present within the subject site reflecting the diversity in the vegetation communities present. The majority of the site is of decreased habitat quality due to the large amount of disturbance through removal and modification of the groundcover and shrublayer through grazing, slashing and previous clearing for pine plantations.

The following fauna habitats are present on the site and on land adjacent to the site:

- Flower, nectar, fruit and seed producing tree and shrub species;
- Hollow-bearing trees;
- Cleared pasture;
- Aquatic areas associated with permanent farm dams and water courses;
- Semi-aquatic habitats associated with low lying areas;
- Dense understorey areas;
- Leaf litter;
- Drainage depressions;
- Aquatic areas associated with the Myall River foreshore and wetland areas.

The flower, nectar, seed and fruit producing tree and shrub species within the site provide a seasonal foraging resource for a range of fauna species, particularly bird and arboreal mammal species. The site contains a relatively low number of hollow-bearing trees with mostly small hollows. These hollows contain potential den, roost and breeding hollows for bird, arboreal mammal, microchiropteran bat and reptile species.

The site consists predominantly of disturbed vegetation types with no shrublayer and a groundcover dominated by pasture grasses. As such the habitat values are decreased for small terrestrial mammal, bird and reptile species. The lack of cover however does increase foraging opportunities for raptorial and other bird species. The open grassed areas contain suitable habitat for macropod species, particularly the Eastern Grey Kangaroo and Red-necked Wallaby.

Areas of the subject site are prone to ponding after rain providing suitable habitat for a range of amphibian species. The drainage depressions associated with tracks and tree removal holes contain suitable foraging and breeding habitat for these locally occurring amphibian species.

The denser, less disturbed vegetation types associated with the Myall River foreshore provide higher quality habitat due to the increased density and diversity of the various structural layers. These less disturbed habitats provide increased foraging, refuge and breeding opportunities for mammal, bird, reptile and amphibian species. This is reflected in the species richness of these vegetation types in comparison to the majority of the site containing the disturbed vegetation communities. These higher quality vegetation and habitat types will be retained as part of the proposed development.

The fauna habitats within the site are typical of those associated with low lying areas of the lower reaches and estuarine areas of the Myall River. The habitats are isolated to the south by Myall Quays estate and the Tea Gardens township and to the east by the Myall River. The highest degree of connectivity extends to the north of the subject site. The area to the north of the site consists of bushland of higher habitat quality due to decreased levels of disturbance. The site also shows some connectivity to similar, larger areas of vegetation and habitat to the west, including lands within Myall River Downs. This area shows connectivity via the slope and low ridgeland areas in the north of the site to large areas of vegetation to the north-west of the subject site.

## SECTION 2

### MANAGEMENT OBJECTIVES AND ACTIONS

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The following section provides details on the objectives and actions of each broad management category. The responsibility and timing for each of the management actions is provided within Table 1 of Section C with each management action sub-heading corresponding with a similar action category within Table 1.

#### 2.1 VEGETATION RETENTION AND BUSHLAND MANAGEMENT

##### Objectives

- **Identify and protect vegetation to be retained within bushland and reserve areas including biodiversity off-set areas**
- **Implement measures to reduce the extent of weed species within retained areas and biodiversity off-set site**
- **Improve the current bushland and biodiversity values of retained areas and biodiversity off-set site**
- **Implement measures to control the risk of weeds spreading from residential development**
- **Promote community involvement in the bushland management and improvement of bushland values**

##### Actions

###### *i) Preparation of Vegetation Management Works Plan*

Reserve and corridor areas within the site are to be targeted for weed removal and rehabilitation with native, provenance specific species. The rehabilitation of these areas will ultimately improve and restore the vegetation and habitat values of those reserve and corridor areas. A specific Vegetation Management Works Plan will be produced for those reserve and corridor areas to direct the specific management actions in relation to vegetation management. These Vegetation Management Plans will include information on:

- the use of provenance specific species in revegetation works
- lists of provenance specific species to be used for revegetation
- identification of key priority areas for works
- detailed weed removal and vegetation management/protection strategies
- inter-relationship of fuel and vegetation management
- timetable for works and details of implementation, responsibility, timing and funding of specific vegetation management works.

## ii) Implementation of weed removal programs

All weed control and vegetation management works will be co-ordinated by the developer of the land or the Community Association who will engage the relevant bush regeneration contractors to complete works as per the Vegetation Management Works Plan for the site.

The majority of weeds occur outside and at the edges of the bushland areas and proposed reserves. However there are also disturbed areas within the site that contain high numbers of weeds.

Species targeted for control include:

- *Lantana camara* (Lantana);
- *Chrysanthemoides monilifera subsp. monilifera* (Bitou Bush);
- *Cinnamomum camphora* (Camphor Laurel);
- *Erythrina x sykesii* (Coral Tree);
- *Ligustrum lucidum* (Broad-leaved Privet);
- *Ligustrum sinense* (Small-leaved Privet);
- Exotic Pine species;
- *Rubus fruticosus* (Blackberry).

Where weeds are identified as occurring appropriate weed control will be undertaken. Weed control can be carried out either through the careful and localised use of chemicals or through physical control methods as outlined below:

- *Physical control methods* involve using physical means such as hand removal and the use of hand tools to remove either specific or broad ranges of weeds. A common physical method for weed removal and subsequent natural revegetation is the Bradley Method. This method involves hand removal and is best for small areas. The use of machinery such as Bobcats, Backhoes, Slashers, etc should not be used for weed removal due to the potential for large scale disturbance to result.
- *Chemical control methods* involve the use herbicides. These herbicides can be specific to a particular plant or more broad ranging types of chemicals. Problems with the use of herbicides include chemical residues affecting soils, herbicide runoff into waterbodies and the health and safety of the operator involved in the application of the herbicide. Advantages of herbicide use include the low time taken to spray weeds as opposed to physically removing them, especially for large infestations of weeds. Broad area spray application is considered inappropriate for this program. Herbicides will be applied by cut and paint or hand held application methods only. Suitable physical control methods are to be the preferred option.

Weed control in the reserve and corridor areas is to be carried out by professional bush regeneration contractors having TAFE qualifications in bushland regeneration (minimum Certificate 2) and under the supervision of a professional bush regenerator who is a member or is eligible for membership of the Australian Association of Bush Regenerators (AABR). Any individuals or groups undertaking weed removal or bush regeneration activities must currently possess or obtain a licence from the NSW Department of Environment and Climate Change.

Within the biodiversity off-set area (Myall River Conservation Area) the targeted removal of the invasive exotic pines is proposed as the principal action for weed control. Exotic pines have been identified as a significant plant pest species in the adjoining Myall Lake National Park (NPWS 2002) therefore a targeted pine removal program is considered to be an appropriate management action for this area.

*iii) Rehabilitation of disturbed areas*

In conjunction with weed removal programs, and as part of the Vegetation Management Works Plan, those disturbed areas identified within the site will be targeted for rehabilitation. The Vegetation Management Works Plan will detail strategies for those areas to be rehabilitated including the use of provenance specific species, long term protection of rehabilitation areas and monitoring and maintenance of rehabilitation areas.

*iv) Erection of signage delineating protection areas*

Signs will be erected throughout Riverside delineating corridor and reserve areas and identifying vegetation protection areas and strategies. This will include information discouraging residents from dumping lawn and garden waste that will have future impacts upon natural areas in terms of potential for weed infestation.

Signs, in conjunction with fencing, can also aid in restricting access to sensitive areas.

Further details on signage management actions are contained in Section B11.

*v) Erection of fencing delineating protection areas*

Fencing can be used to delineate vegetation and bushland protection areas, particularly those areas undergoing vegetation rehabilitation. Sensitive areas such as the SEPP 14 wetland area can also be fenced to restrict pedestrian and vehicular access.

Further details on fencing management actions are contained in Section B11.

*vi) Monitoring of vegetation management areas*

Full details of monitoring are included in Section B12.

*vii) Encouragement of community initiatives*

The encouragement and establishment of local community groups (such as Landcare) will aid in the organisation and carrying out of weed removal and vegetation rehabilitation programs will encourage partial ownership of the bushland values of Riverside by the community.

The establishment of site specific community groups should be developed as an initiative between the developers of the land and the Community Association.

## 2.2 BUSHFIRE MANAGEMENT

### Objectives

- **Ensure all bushfire protection measures occur outside of bushland areas retained for conservation or off-set purposes**
- **Maximise tree and habitat protection**
- **Ensure that bushfire protection measures are implemented to reduce the risk of bushfire from retained bushland areas upon adjacent property**

### Actions

*i) Incorporate the findings of the Bushfire Protection Assessment which identified the requirements for bushfire protection measures for asset protection zones*

A Bushfire Protection Assessment (Conacher Environmental Group 2011a) has been prepared for the site. This Bushfire Protection Assessment identifies the bushfire protection strategies required to protect developed areas within Riverside. These strategies need to be incorporated into the vegetation management of the site.

*ii) Identification of retained areas and Asset Protection Zone (APZ) boundaries prior to construction*

Prior to construction commencing those areas to be retained as corridor and reserve and their adjacent APZ's are to be delineated on site plans and survey marked in the field. This will minimise the risk of damage to vegetation contained within retained areas and APZ's during construction.

*iii) Maximise tree protection in APZ's*

A discontinuous tree canopy is required as establishment of the Inner Protection Area of APZ's. It is considered that due to the relatively open nature of the vegetation communities present within that site that tree clearing required as part of the establishment of APZ's will be minimal.

*iv) Monitor bushfire risk within retained bushland areas*

While all hazard reduction is to occur outside of reserve, corridor areas and off-set areas the vegetation and accumulation of fuel and consequent bushfire risk over time within the reserve and corridor areas is to be monitored as a long term strategy. Full details of monitoring will be included within the Vegetation and Bushfire Management Plan.

*iv) Implementation fire hazard reduction and fuel management where considered necessary in accordance with vegetation management principles*

This may require future ecological burn strategies to be implemented using a sector/mosaic burn plan based physical/mechanical actions to reduce inground fuel levels or on best knowledge of appropriate regimes for the various vegetation communities present within the site. The results of monitoring will be used to plan for any subsequent fuel reduction operations

carried out in conjunction with the RFS and other relevant statutory authorities such as the NSW Department of Environment and Climate Change.

## **2.3 PROVISION AND ESTABLISHMENT OF ENVIRONMENTAL CORRIDORS**

### **Objectives**

- **Protect the sites ecological value as a movement area for local fauna**
- **Minimise the impacts of development upon local fauna**
- **Provide green space for residents to maximise the sites aesthetic values and recreational opportunity**
- **Maximise environmental values of drainage and water management areas**

### **Actions**

#### *i) Establish Wildlife Corridors as key component of the concept design*

The Wildlife Corridors areas have been provided within the proposal to retain connectivity within the post development landscape and provision for fauna movement through the area. These consist of a north-west running corridor in the east of the site and an east-west running corridor at the northern boundary of the site. These areas will allow movement through the site to greater areas of habitat to the north, particularly for arboreal and terrestrial fauna species. These areas will also provide a lesser open space/recreational role.

These Wildlife Corridors will provide continuity of habitat and movement areas for local fauna within the development and between habitat areas within the local landscape. This includes movement areas and habitats for threatened species including the Squirrel Glider, Koala and threatened microchiropteran bat species.

Vegetation and habitats within these areas will be managed under specific vegetation and habitat management planning proposed for the site.

#### *ii Establish Drainage Corridors as key component of the concept design*

Drainage corridors have been proposed as part of the development concept layout for water/drainage management. These areas will serve a function in providing landscape linkage and providing habitat for semi-aquatic species within the site, particularly amphibian species, including the Wallum Froglet. These areas will also provide a lesser open space/recreational role.

## **2.4 PROVISION OF ENVIRONMENTAL BUFFERS**

### **Objectives**

- **Protect the values of retained vegetation and habitats within the site**
- **Reduce occurrence and severity of edge effects on retained vegetation**



- **Maximise use of Asset Protection Zones in acting as environmental buffers**
- **Maximise the opportunity for vegetation management within environmental buffers**
- **Protect sensitive environments including riparian, estuarine and wetland areas**

*i) Establish buffer areas between development areas and environments associated with the Myall River*

The less disturbed vegetation communities within the site associated with the Myall River will be retained as part of the concept development proposal. This includes the retention of Swamp Forest, Closed Heathland, Closed Rushland and Mangrove complex vegetation communities. The retention of these communities will provide an approximately 150m to 500m buffer between the development edge and the banks of the Myall River. The establishment retention of these areas as buffers will provide for the protection of the Myall River from potential offsite and downstream impacts of adjacent development. This also includes the protection of areas of the endangered ecological community Coastal Saltmarsh. These buffers were identified and included in environmental protection zones as part of the outcomes of the rezoning process.

*ii) Implement vegetation management strategies within buffer areas*

The outer 20 metres of the buffer areas will be targeted for vegetation management. The implementation of vegetation management actions within buffer areas will increase these areas ability to protect vegetation and habitats from the impacts of development. These actions will include:

- weed removal
- replanting
- erosion and sediment control
- fencing
- monitoring
- ongoing maintenance

*iii) Restrict vehicle access to buffer areas*

Access to buffer areas by vehicles will be restricted and prohibited, other than for vegetation management purposes.

## **2.5 EROSION AND SEDIMENT CONTROL**

### **Objectives**

- **Protect the soil properties of the area during the construction and occupation phases of the development**
- **Minimise risk of sedimentation of downstream aquatic areas**
- **Maximise use for in-situ replacement and use of displaced topsoil**

## **Actions**

### *i) Prepare an Erosion and Sediment Control Plan for the site*

Development within the site is adjacent to sensitive areas including the Myall River and associated SEPP 14 wetlands. To minimise the impacts of downstream sedimentation to aquatic environments an Erosion and Sediment Control Plan will be prepared for the site.

The Erosion and Sediment Control Plan will detail the strategies required for the minimisation of erosion within the site and the control of potential sedimentation impacts likely as a result of any erosion. The Erosion and Sediment Control Plan will detail the strategies required for the construction and occupation phases of the development.

This plan is to be prepared by a qualified Engineer and in accordance with best practice industry standards and Great Lakes Councils Erosion and Sediment Control Policy. The plan will also consider Council's Port Stephens/Myall Lakes Estuary Management Plan.

### *ii) Provide erosion and sediment control devices in accordance with best practice industry standards*

The Erosion and Sediment Control Plan will detail measures for the installation, ongoing use monitoring and maintenance of erosion and sediment control devices during all construction and occupation phases of development.

### *iii) Implement suitable protection measures for storing of topsoil and on-site re-use*

All topsoil stripped from the site will be stored and re-used on site. Topsoil and spoil shall be stockpiled in non-hazard areas and protected from surface run-off by diversion drains or similar. Stockpiles are to be surrounded on down-stream sides by silt fencing and stockpiles shall be suitably compacted to inhibit erosion. Where the stockpiling period exceeds four (4) weeks, the stockpile shall be seeded to encourage vegetation growth and reduce further loss due to water/wind erosion.

### *iv) Restrict access to disturbed areas during construction*

Access to disturbed areas during construction will be restricted, particularly following rainfall.

### *v) Rehabilitate disturbed areas immediately upon the cessation of construction activities*

All disturbed areas will be rehabilitated according to actions detailed within the Erosion and Sediment Control Plan and Vegetation Management Plan immediately following the completion of site construction activities.

### *vi) Monitor erosion and sediment control devices and downstream and aquatic areas for evidence of soil loss and sedimentation*

## 2.6 STORMWATER QUALITY AND MANAGEMENT

### Objectives

- Provide suitable stormwater control devices that maximise habitat opportunities for flora and fauna
- Provide suitable stormwater control devices that maximise passive recreational opportunities
- Locate and design stormwater structures within the development in accordance with the conservation and protection principles of this Management Strategy to minimise environmental impacts

### Actions

- i) *Integrate landscape design initiatives into stormwater control structures that maximise benefits to local aquatic and semi-aquatic flora and fauna species*

Measures are to include promotion of growth of native fringing vegetation, monitoring of water quality, weed removal and monitoring for presence of predatory *Gambusia holbrooki*. Design of detention and sedimentation structures will incorporate features to facilitate *Gambusia* eradication. These measures may be addressed within individual habitat management plans for each proposed basin.

## 2.7 CULTURAL HERITAGE VALUES AND MANAGEMENT

### Objectives

- Protect the cultural heritage values of the local area
- Provide information to the community on the cultural heritage values of the Riverside area

### Actions

Consider the implementation of the recommendations of the Cultural Heritage Report by ERM Australia.

## 2.8 COMMUNITY EDUCATION, VIGILANCE AND REPORTING

### Objectives

- Promote ownership and appropriate use of the natural areas within Riverside by the community
- Promote community vigilance in reporting prohibited use
- Promote community involvement in wildlife observation and protection
- Encourage local involvement in bushland rehabilitation schemes

- **Provide information to the community on the environmental, cultural and recreational values of the area**

## **Actions**

*i) Provide informative pamphlet to residents at point of sale and update/supply regularly*

A pamphlet will be supplied to residents at the point of sale to supply information in regards to the sites natural area values. The pamphlet will include information on:

- The area covered by the Riverside development and the reserve and corridors within;
- History of the area;
- Access points and any walking trails;
- Prohibited uses and reasons for restricted use;
- Location of any facilities or important ecological/cultural features;
- Accepted passive recreational uses of the area;
- Significant flora and fauna (particularly threatened species) and habitats;
- Practices to reduce the impacts of adjacent use upon the corridor (eg. Use of locally occurring garden species, limited use of fertilisers, controlling pets, weed management, fauna monitoring, habitat creation);
- Contact details with regard to reporting prohibited use, fauna injuries;
- Landcare/Bush regeneration details;
- Sources of further information (e.g. Great Lakes Council, DECC websites);

*ii) Provide interpretive signing around extent of retained reserve and corridor areas to inform community of values and appropriate use*

Signage will include information on:

- Ownership and management of the land;
- Bushland values;
- Prohibited activities (eg: rubbish dumping, vehicular access, entry of cats, off lead dogs);
- Permitted activities;
- Contact/Reporting details;
- Penalties for misuse;
- Indicative map of natural areas within riverside.

*iii) Encourage community and resident ownership and involvement through use of Community Title initiatives*

Residential areas of the site are to be administered under the provisions of Community Title. This approach allows for ongoing regulation of activities, including maintenance within the entire development area, within individual allotments, within bushfire protection areas, vegetation retention areas and within common community association areas. This approach also provides substantial benefits in terms of regulating the impact of the development upon the natural environment into the future.

The Community Management Statement embodies the Legal Framework under which the Community Association operates defining its purpose, responsibilities, procedures and by-laws

which regulate the association and its members. The Community Management Statement, by definition, places the burden of ongoing environmental management works upon the landholders thus ensuring the implementation of these works in perpetuity.

## 2.9 PROHIBITED USE IDENTIFICATION AND MANAGEMENT

### Objectives

- **Identify likely uses of the natural areas within the Riverside development that may have impacts upon ecological and environmental values**
- **Encourage appropriate uses of the natural areas within Riverside by the community**
- **Promote community awareness and vigilance of reporting of prohibited uses**
- **Implement mechanisms for penalties for mis-use of natural areas**

### Actions

*i) Erect prohibited use signage*

Potential uses of the natural areas of Riverside to be identified as prohibited uses are:

- Rubbish dumping;
- Vehicular (4WD and trail bike) access;
- Off-leash dogs;
- Flora/fauna harm or removal;
- Horse riding;
- Dead wood removal.

*ii) Implement community education programs to encourage the appropriate low impact, passive use of reserve and corridor areas*

Community education material (pamphlets/signage) will include information on appropriate use of the natural areas within the site. Passive use of the site will be encouraged with activities such as walking, fauna observation to have facilities provided for (eg. walking trails, boardwalks, viewing platforms). Those recreational activities likely to cause harm will be discouraged (walking off set trails, trailbiking, horse riding, unleashed dog walking, camping).

*iii) Restrict access to reserve and corridor areas, particularly to vehicles, trail bikes and horses*

The recreational opportunities and use of the site will be controlled by the provision of services and access to those services. Access to reserve areas and the facilities within those areas will be restricted to service vehicles and pedestrian traffic only.

Access to walking/service trails will be restricted by locked gates or bollards. Unauthorised vehicular access will not be permitted and identified as a prohibited use.

## 2.10 NATIVE FAUNA, HABITAT AND FERAL PEST SPECIES MANAGEMENT

### Objectives

- Provide suitable strategies for the protection of native fauna species within the post development landscape
- Provide adequate protection and habitats for threatened species known from the area
- Provide compensatory (off-set) habitat for native fauna and flora
- Minimise human related impacts upon local native fauna
- Protect key den, nest, roost and foraging resources by establishing adequate bushland reserves
- Control and/or remove pest fauna species and invasive flora species from the conservation areas of the site
- Reduce the risk of damage to native flora and fauna resulting from the occurrence of pest species related to human occupation

### Actions

i) *Provide compensatory habitat within retained areas, particularly nest and roost boxes*

#### a. Nest Boxes

Relative low densities of hollow-bearing trees have been recorded within the subject site. These hollows ranged in size from small to medium (<5cm to 30cm) suitable for a number of hollow dependent fauna species observed during surveys. These include:

- |                                |                          |
|--------------------------------|--------------------------|
| * Green Tree Snake             | * Rainbow Lorikeet       |
| * Galah                        | * Musk Lorikeet          |
| * Scaly-breasted Lorikeet      | * Squirrel Glider        |
| * Eastern Rosella              | * Feather-tail Glider    |
| * Common Brushtail Possum      | * Common Ringtail Possum |
| * Microchiropteran bat species |                          |

As part of the Master planning process it is proposed to retain all hollow-bearing trees within the undeveloped areas of the site. However, in the interests of providing net gains in habitat nest and roost boxes are proposed to be erected within trees in those reserve and corridor areas to be retained by the development.

It is considered that 2-3 nest boxes per hectare of current suitable habitat to be cleared will be erected as compensatory habitat within the retained and protected reserve and corridor areas. This equates to between 200-300 replacement nest boxes. This will consist of a mix of Squirrel Glider, possum, micro chiropteran bat, small and large parrot boxes.

The following specific management strategies are to be carried out in relation to nest boxes:

- All replacement nest boxes are to be secured to trees at a minimum height of four metres above ground level facing the east to north east direction. An experienced arborist is required to install the nest boxes. Nest boxes and re-erected limbs are not to be placed near locations where public access is planned along entrance points or tracks. All nest boxes and re-erected limbs will be inspected annually and any damaged, or in danger of falling, are to be repaired or replaced. The locations of each of the erected nest boxes or re-erected hollows will be mapped for later reference.
- A fauna ecologist (Project Ecologist) is to co-ordinate the construction and erection of nest boxes and locate appropriate trees and locations for installing the nest boxes. The locations of all nest boxes and re-erected hollows are to be included on plans provided with annual progress reports. Each box is to be identified with a readable, weather resistant number (75mm) in size for identification and recording purposes.
- All nest boxes will be inspected regularly for the life of this plan. Any damaged or dangerous boxes will be replaced. Any boxes seen to contain exotic fauna (Indian Myna, European Bees) will have fauna removed or the nest box replaced.
- The locations of all nest boxes will be fixed by GPS as part of ongoing monitoring strategies.
- All nest boxes will be constructed of a durable marine ply material and fixed to trees by qualified climbers using stainless steel bolts. Boxes will be hinged for ease of future monitoring.

The habitats within the reserve and corridor areas will be enhanced by the implementation of vegetation management strategies. The removal of weeds and rehabilitation of disturbed areas and community involvement has been discussed within Section B1.

*ii) Supervise clearing works during construction*

The removal of hollow bearing trees will occur as part of this development. To minimise the impact on hollow dependant fauna during tree felling operations the following measures will be used were considered appropriate:

- Identification and marking of hollow bearing trees required to be cleared;
- Inspection of tree hollows by spotlight survey and appropriate bat detection methods immediately prior to clearing to determine if hollows are being utilised by tree dwelling fauna, including threatened species;
- Implementation of a trapping program prior to tree clearing to trap any mammal fauna within areas proposed for staged clearing. Any trapped animals will be released into appropriate areas on dusk;
- Inspection of hollow bearing trees marked for clearing. Trees will be felled in sections of approximately one-metre lengths. Inspections of hollow sections prior to felling will be undertaken to determine if fauna is present within hollows. Fauna occupying hollows will

be carefully removed by an experienced and licensed fauna expert and relocated to another tree away from the area of clearing;

- Restriction of clearing hollow bearing trees during the breeding season for microchiropteran bats and Squirrel Glider (September-March);
- Implementation of hollow log salvage and re-erection program in order to retain roosting and nesting opportunities for hollow dependent fauna, including Owls, Squirrel Gliders and threatened bat species;

Two options are available for removing tree hollows or felling hollow bearing trees. These are:

- i) Hollow bearing trees containing fauna are to be sectionally dismantled. This will involve an arborist / tree climber to hand removal hollow limbs into one metre lengths. Each hollow length will be inspected for fauna occupation. Once all hollow limbs are dismantled the tree can be felled by machine. Fauna occupying hollows will be carefully removed by the Project Ecologist and relocated to adjoining corridor or reserve areas.
- ii) Where machinery is required to fell hollow trees, the blade or bucket of the machinery will be tapped against the base of the tree to disturb any fauna present. The tree will then be felled as gently as possible. All hollow limbs will be inspected after felling for occupation by fauna. Any fauna will be removed and relocated to adjoining bushland.

Any felling of hollow bearing trees will be supervised by a qualified fauna ecologist (Project Ecologist).

All hollow limbs will be removed from those trees felled by a licensed contractor. These hollow limbs will be returned to the Project Ecologist for re-use at a later date.

- iii) *Provide information within community education material encouraging the provision of habitat for native fauna species within residential allotments*

Information will be included within interpretive material on the importance of providing suitable landscape initiatives within residential areas for the provision of habitat for native species within urban areas.

- iv) *Implement suitable initiatives to control impacts of domestic pets upon local fauna*

The following will form part of strategies in minimising the risks posed to native wildlife of domestic animals:

- All domestic pets kept within fenced yards
- Covenants restricting cat ownership
- Curfews on cats
- All dogs to be kept on leash when out of yards and in open space areas
- Penalties for unrestrained animals

- v) *Implement feral pest control programs, particularly for rabbits, foxes, Mosquitofish and Noisy Miner*



Suitable management strategies will be implemented for the control of feral animals, particularly the fox, rabbits, Mosquito fish and Noisy Miner. This will include engaging a licensed pest controller to carry out regular programs, when required, within the site, particularly those corridor and reserve areas.

*vi) Monitor distribution and abundance within the site of threatened species, native fauna and pest species*

Regular monitoring will be implemented to gather information on the occurrence of native fauna, particularly threatened species, and pest species within the site. Full details are provided within Section B12.

## **2.11 ACCESS, SIGNAGE AND FENCING**

### **Objectives**

- **Protect the environmental values of natural areas throughout the Riverside development through appropriate signage and fencing**
- **Protect environmentally sensitive areas through restriction of access**
- **Increase community awareness of environmental values of natural areas through appropriate signage**

### **Actions**

*i) Erect interpretive signing around corridor and reserve areas providing community and residents with information on access restriction, appropriate use, prohibited use and environmental values*

Interpretive signing will be erected around the boundaries and within reserve and corridor areas. This will include information on:

- Location of reserve and corridor areas (site plan);
- Prohibited uses;
- Natural features of the site (flora/fauna/habitats/wetlands etc);
- Recreational opportunities;
- Contact details;
- “No go” areas;
- Penalties for misuse.

*ii) Erect fencing during construction to protect individual trees*

Where trees are identified for retention and are in areas adjacent to construction areas tree protection fencing will be erected to eliminate risk of damage during construction. Fencing will be erected to adequately protect the root zone of trees from excavation or compaction damage.

*iii) Erect fencing during construction to protect reserve and corridor areas*

Where corridor or reserve areas are adjacent to construction areas temporary fencing will be erected to indicate these no go areas. This will be supported by site contractor inductions notifying personnel of protection areas and restricted access to these.

*iv) Erect bollards or fencing to restrict access to environmentally sensitive areas*

Bollards or fencing will be erected to control access to environmentally sensitive areas within the site such as SEPP 14 Wetland areas and conservation zones. Temporary fencing will also be erected to protect areas that are undergoing vegetation management to protect juvenile plants.

*v) Monitor signage and fencing and repair/replace when necessary*

The management program will include monitoring of condition of signs, fencing and bollards to allow for damaged structures to be replaced or repaired. Full details of monitoring are included within Section 2.12.

## **2.12 MONITORING AND REPORTING REGIME**

### **Objectives**

- **Collect long term information on the environmental and ecological quality of natural areas and impacts of development within the Riverside development**
- **Collect long term information on impacts of the development upon reserve and corridor areas and make contingency for the implementation of appropriate rehabilitative and compensatory measures**
- **Collect long term information on the success of ameliorative measures introduced as part of this management strategy**
- **Collect information on the occurrence of threatened species, native fauna and condition of vegetation within reserve and corridor areas**
- **Provide regular meaningful reports to statutory authorities on the results of monitoring and other ongoing issues and make these available to the Community Association and other local interest groups**

### **Actions**

The monitoring program will be designed to collect information over the long term on key environmental and ecological parameters to provide information on the long term environmental health of the reserve and corridor areas. These consist of the following:

- **Threatened species:**
  - Wallum Froglet;
  - Osprey;
  - Barking Owl;
  - Squirrel Glider;
  - Koala;

- Grey-headed Flying-fox;
- Greater Broad-nosed Bat;
- Eastern Bentwing-bat
- Little Bentwing-bat;
- Large-footed Myotis.
- Native fauna
- Native vegetation and bushland
- Weeds
- Rubbish
- Nest boxes
- Pest species

*i) Monitor occurrence and persistence of threatened species*

*Wallum Froglet*

The Wallum Froglet has been recorded within a number of locations within the site. The monitoring program is to be designed so as to detect the continued presence of this species within those suitable habitat areas retained within the site. Surveys are to be completed bi-annually and annually and consist of call detection and call playback, particularly during times of peak detection (i.e. after rain April-Nov).

*Osprey*

The Osprey was been recorded within the subject site during surveys conducted in February 2008. This species was observed roosting in trees on the shoreline of the Myall River. Monitoring programs are to be designed so as to detect the continued presence of this species within the area. Bi-annual surveys are to be carried out to detect the continued presence of this species within the subject site and to record any nesting activity that may occur. Surveys are to consist of diurnal observation surveys.

*Barking Owl*

The Barking Owl was been recorded calling in areas to the north of the subject site during nocturnal owl call playback surveys conducted in February 2008. Monitoring programs are to be designed so as to detect the continued presence of this species within the area. Bi-annual surveys are to be carried out to detect the continued presence of this species within the subject site and to record any nesting activity that may occur. Surveys are to consist of nocturnal call playback and spotlighting surveys.

*Squirrel Glider*

The Squirrel Glider has been recorded within vegetation near the northern boundary of the site. Monitoring programs are to be designed so as to detect the continued presence of this species within the area. Bi-annual surveys are to be carried out to detect the continued presence of this species within reserve and corridor areas. Surveys are to consist of arboreal Elliott trapping, spotlighting and nest box inspection.

## *Koala*

There are no recent local records for the Koala within the subject site; however it is known to occur within the local area. The site contains suitable foraging and refuge habitat for this species. Monitoring is to be carried out bi-annually for this species to detect any future use of the site. Monitoring is to consist of Spot Assessment Techniques, spotlighting and call playback. Full details of the monitoring program are included within the Koala Management Strategy prepared for the site.

## *Grey-headed Flying-fox*

The Grey-headed Flying-fox was been recorded within the subject site during nocturnal surveys conducted in February 2008. This species was observed foraging in flowering eucalypt trees within the subject site. Monitoring programs are to be designed so as to detect the continued presence of this species within the area. Bi-annual surveys are to be carried out to detect the continued presence of this species within the subject site and to record any roosting camp activity that may occur. Surveys are to consist of nocturnal spotlighting surveys.

## *Microchiropteran Bat Species (Greater Broad-nosed Bat, Little Bentwing-bat, Eastern Bentwing-bat, Large-footed Myotis )*

Four threatened microchiropteran bat species have been recorded within the site during previous surveys. The area contains foraging, roosting and breeding habitat for these species. Monitoring programs are to be designed so as to detect the continued presence of this species within the area. Surveys for these species are to be carried out biannually and consist of Anabat echolocation recording.

### *ii) Monitor abundance and diversity of native fauna species*

The monitoring program is to include collection of information on the diversity of fauna species within the site. Standard fauna survey methods targeting vertebrate groups (mammals, birds, reptiles, amphibians) is to be completed seasonally and bi-annually to gather information on the diversity of fauna species within the site for year to year comparison and also comparison against baseline data.

### *iii) Monitor condition of native vegetation and bushland including rehabilitation areas*

The monitoring program will include monitoring the condition of vegetation within those areas undergoing vegetation management works within the site, particularly those rehabilitation areas. Monitoring is to be carried out annually to assess the condition of rehabilitation areas and make contingency for additional rehabilitation and protection works if the results of monitoring indicate the need.

### *iv) Monitor occurrence and extent of weeds and rubbish*

The extent of weeds within the retained bushland and off-set areas are to be monitored annually. Where weeds are observed to be increasing removal programs will be carried out. This could be implemented as part of community initiatives as discussed in Section B8.

Monitoring for incidences of rubbish dumping will be carried out regularly. Where build up of rubbish is observed removal programs are to be carried out. This could also be implemented as part of community initiatives as discussed in Section B8.

*vi) Monitor occurrence of pest fauna species*

Monitoring will include gathering information on the presence of the following pest species:

- Foxes;
- Rabbits;
- Gambusia;
- Common Myna;
- Cats;
- Dogs.

The collection will allow for the occurrence of pest species to be recorded and provision made for their removal from those retained areas.

Any signs of predation by foxes, dogs or cats will also be monitored and reported on.

*vii) Produce regular meaningful reports on results of surveys and provide analysis against baseline information*

Reports will be supplied regularly to the Community Association and relevant statutory authorities in conjunction with the end of each monitoring period.

At the completion of each monitoring period an assessment report will be completed detailing all methodologies used and results gained during surveys for that monitoring period. The report is included as a minimum:

- details on survey methods;
- results of surveys;
- comparison between monitoring/reporting periods;
- management issues;
- any suggested amendments to management plan.

*viii) Make contingency for review of management actions where monitoring identifies significant impacts*

Management actions will be reviewed regularly as part of the monitoring and reporting process. Where impacts are identified that indicate the failure of management actions or the requirement for new management actions contingency will be made for these to be addressed within the ongoing environmental management framework.

## SECTION 3

### IMPLEMENTATION OF MANAGEMENT ACTIONS

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#### 3.1 IMPLEMENTATION OF MANAGEMENT ACTIONS

It is envisaged that the management strategies included within this plan will be enforced as conditions of consent for various stages of approval for the development application. Following review of the application by the various authorities it is considered that further refinement of the management actions and implementation will be required for the various stages of the approved development. This may be achieved by the preparation of individual Management Plans for the various development stages with this Ecological Site Management Strategy to form the basis of the objectives, actions and implementation strategies of those plans.

The actions detailed within this Management Strategy will be implemented over a minimum ten year period following signoff of the plan by the Department of Planning and Infrastructure. The long term timing, implementation and responsibility of those actions will ultimately depend upon the development of the various stages of the development and the title on the land. The location of the various management areas is shown in Figure 1.

Table 1 provides details on the implementation of management actions contained within Section B. Each of the actions relates to a Management Area within the Riverside area. These areas have been identified to ensure that only those actions relevant to certain areas are applied to the relevant area. These Management Areas have been separated as per the following:

- Management Area A – SEPP 14 Wetlands;
- Management Area B – Conservation Zoned Lands;
- Management Area C – Asset Protection Zones and Environmental Buffers;
- Management Area D – Wildlife Corridors;
- Management Area E – Drainage Corridors;
- Management Area F – Developable Area.

#### **Management Area A – SEPP 14 Wetlands**

The area within Management Area A is that low-lying land associated with the Myall River and bound by State Environmental Protection Policy No. 14 Coastal Wetlands known as wetland number 746. This area corresponds with an area mapped as 7(a) Wetlands and Littoral Rainforest Zone within the Great Lakes LEP. This area will be wholly retained as part of the proposed development. The SEPP 14 Wetland will also be buffered by the retention of vegetation communities between the wetland boundary and the development edge. Management within this area will primarily consist of weed management via regular inspections, and low impact weed control works where and when necessary. Bushfire hazard reduction activities will not be undertaken in this management area.

#### **Management Area B – Conservation Zoned Land**

This area consists of land zoned 7(b) Conservation Zone and contains land of conservation and environmental significance. This area is adjacent to the land within SEPP 14 wetlands and serves a buffer function in protecting the wetland area from adjacent use. The vegetation within this land zoned for conservation consists of relatively high quality Closed Heathland and Swamp Forest vegetation. Management within this area will primarily consist of weed management via

regular inspections, and low impact weed control works where and when necessary. Bushfire hazard reduction activities will not be undertaken in this management area.

### **Management Area C – Asset Protection Zones and Environmental Buffers**

These areas consist of those areas adjacent to development that are retained as buffer areas to adjacent reserved lands or are retained and modified as part of Asset Protection Zones (APZs). These areas serve as the interface between developed lands and those areas of native vegetation retained due to high conservation value, environmental significance or habitat and landscape function. These areas will contain a reduced amount of vegetation within semi-natural areas. Areas designated as bushfire APZs will be managed in accordance with the requirements for APZs in Planning for Bushfire Protection (RFS 2006). It is likely that some of these areas will incorporate grassy swale / nutrient sinks, some stormwater management areas, ephemeral drainage lines and parklands.

Asset Protection Zones and Environmental Buffers are located within or adjacent to a large number of habitat types across the site. Replanting zones labelled A to G having different treatment requirements have been created to better define the species to be used and the densities required to be planted (See Figures A4.1 and A4.2 and Table 2). This is to ensure that future revegetated areas are consistent with the habitat and existing vegetation types within or adjacent to the replanting zones. Where revegetation is required within these areas species to be planted and the densities of plantings required are shown in Table 2. The location of zones (labelled with a prefix of A to G) that may require replanting is shown in Figure A4.2 - Re-vegetation Zones.

### **Management Area D – Wildlife Corridors**

These Wildlife Corridor areas have been provided to retain connectivity within the post development landscape and provision of fauna movement through the area. These consist of a north-west running corridor in the east of the site and an east-west running corridor at the northern boundary of the site. Management within these areas will primarily consist of weed management via regular inspections, and low impact weed control works where and when necessary.

These areas will allow movement through the site to greater areas of habitat to the north, particularly for arboreal and terrestrial fauna species. Those other areas retained in Management Areas A and B will also function in a landscape connectivity capacity.

The Wildlife Corridors will be consolidated / augmented by replanting within existing disturbed areas. Areas of replanting works are shown in Figure A4.2 – Re-vegetation Zones which designates zones with a prefix between A and G. The species and the densities to be replanted within the specific zones are shown in Table 2.

### **Management Area E – Drainage Corridors and Open Space Areas**

The lands contained within Management Area E consist of areas set aside for water/drainage management. These areas will also serve a function in providing landscape linkage and providing habitat for semi-aquatic species within the site, particularly amphibian species. These areas will also provide a lesser open space/recreational role.

The drainage corridors will contain a number of habitat types such as Parkland, Freshwater Edges, Fresh Waterbodies and Saline Shores. Areas of replanting works are shown in Figure A4.2 – Re-vegetation Zones which designates zones with a prefix of G for the Drainage Corridor areas. The species and the densities to be replanted within the G zones are shown in Table 2.

**Management Area F – Developable Area**

This area consists of the land to be developed for residential and commercial purposes. The management actions to be implemented within Management Areas A to E are ultimately as a result of the activities that are to be carried out within Management Area F.



**TABLE 1  
APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN RIVERSIDE**

SITE ISSUE	ACTION	APPLICABILITY OF MANAGEMENT ACTION FOR MANAGEMENT AREA						RESPONSIBILITIES	TIMING
		A	B	C	D	E	F		
<b>B1. Vegetation and Bushland Management</b>	i) Prepare Vegetation Management Plan	√	√	√	√	√		Applicant	Pre-construction
	ii) Weed removal programs	√	√	√	√	√		As part of Development Consent Contractor	Pre-construction, construction and ongoing through occupation
	iii) Rehabilitate / replant disturbed areas	√	√		√	√		As part of Development Consent Contractor	Pre-construction, construction and ongoing through occupation
	iv) Erect signage	√	√	√	√	√	√	Contractor	Pre-construction
	v) Erect protective fencing		√	√	√	√	√	Contractor	Pre-construction
	vi) Monitor vegetation management areas	√	√	√	√	√		Project Ecologist	Construction and ongoing through occupation
	vii) Encourage Landcare initiatives	√	√	√	√	√	√	Project Ecologist	Occupation
<b>B2. Bushfire Management</b>	i) Prepare Bushfire Protection Assessment			√	√	√	√	Applicant	
	ii) Identify APZ's prior to construction			√	√	√	√	Project Ecologist	
	iii) Maximise tree protection in APZ's			√	√	√	√	Contractor	
	iv) Monitor bushfire risk	√	√					Project Ecologist	
	v) Fire hazard reduction			√	√	√		Contractor	

**TABLE 1 (Cont.)  
APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN RIVERSIDE**

SITE ISSUE	ACTION	APPLICABILITY OF MANAGEMENT ACTION FOR MANAGEMENT AREA						RESPONSIBILITIES	TIMING
		A	B	C	D	E	F		
<b>B3. Provision &amp; Establishment of Environmental Corridors</b>	i) Establish Wildlife Corridors				√			Applicant Consent Conditions	Pre-construction and ongoing through occupation
	ii) Establish Drainage Corridors					√		Applicant Consent Conditions	Pre-construction and ongoing through occupation
<b>B4. Provision of Environmental Buffers</b>	i) Establish buffer areas between development and Myall River	√	√	√				Applicant Consent Conditions	Pre-construction and ongoing through occupation
	ii) Implement vegetation management strategies	√	√	√				Applicant Consent Conditions	Pre-construction and ongoing through occupation
	iii) Restrict vehicle access	√	√	√				Applicant Consent Conditions	Pre-construction and ongoing through occupation
<b>B5. Erosion and Sediment Control</b>	i) Prepare Erosion and Sediment Control Plan						√	Contractor	Pre-construction and ongoing through occupation
	ii) Provide erosion and sediment control devices				√		√	Contractor	Pre-construction, operational through construction
	iii) Implement topsoil storage and re-use methods						√	Contractor	Construction
	iv) Restrict access to disturbed areas						√	Contractor	Construction
	v) Rehabilitate disturbed areas						√	Contractor	Construction
	vi) Monitor erosion and sediment control devices/effectiveness						√	Project Ecologist	Construction

**TABLE 1 (Cont.)  
APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN RIVERSIDE**

SITE ISSUE	ACTION	APPLICABILITY OF MANAGEMENT ACTION FOR MANAGEMENT AREA						RESPONSIBILITIES	TIMING
		A	B	C	D	E	F		
<b>B6. Stormwater Quality Management</b>	i) Landscape/habitat design initiatives in structures				√		√	Applicant	Pre-construction
	ii) Advice from qualified ecologists				√		√	Applicant/Consultant	Pre-construction
	iii) Landscape and habitat design plans				√		√	Applicant/Consultant	Pre-construction
	iv) Locate structures in appropriate areas				√		√	Consent Conditions	Pre-construction
<b>B7. Cultural Heritage Values and Management</b>	i) Identification and protection of sites	√	√	√	√	√	√	Consent Conditions	Pre-construction
	ii) Provision of information to community	√	√	√	√	√	√	Applicant	Occupation
<b>B8. Community Education, Vigilance and Reporting</b>	i) Informative pamphlet to residents						√	Applicant	Occupation
	ii) Interpretive signage	√	√	√	√	√	√	Applicant/Consultant	Construction
	iii) Encourage community and resident ownership	√	√	√	√	√	√	Applicant	Occupation
<b>B9. Prohibited Use Identification and Management</b>	i) Erect prohibited use signage	√	√	√	√	√	√	Contractor	Construction
	ii) Promote low impact/passive use	√	√	√	√	√	√	Applicant	Occupation
	iii) Restrict access to reserve areas	√	√	√	√	√		Consent Conditions	Construction

**TABLE 1 (Cont.)  
APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN RIVERSIDE**

SITE ISSUE	ACTION	APPLICABILITY OF MANAGEMENT ACTION FOR MANAGEMENT AREA						RESPONSIBILITIES	TIMING
		A	B	C	D	E	F		
<b>B10. Native Fauna, Habitat and Feral Pest Species Management</b>	i) Provide compensatory habitat (nest boxes)		√		√	√		Applicant/Consent Conditions	Pre-construction
	ii) Supervise clearing works					√	√	Project Ecologist	Construction
	iii) Protection of threatened species	√	√	√	√	√	√	Contractor	Construction
	iv) Community education material	√	√	√	√	√	√	Applicant Conditions of Consent	Occupation
	v) Domestic pet control						√	Community Title Plan	Occupation
	vi) Feral pest control	√	√	√	√	√	√	Community Title Plan	Pre-construction to ongoing works during occupation
	vii) Monitor fauna distribution and abundance	√	√	√	√	√	√	Project Ecologist	Pre-construction to ongoing works during occupation
<b>B11. Access, Signage and Fencing</b>	i) Erect interpretive signing	√	√	√	√	√	√	Contractor	Construction
	ii) Erect tree protection fencing			√	√	√	√	Contractor	Pre-construction
	iii) Erect fencing corridor/reserve protective fencing		√	√	√	√		Contractor	Pre-construction
	iv) Erect fencing/bollards for environmentally sensitive areas	√	√	√	√	√		Contractor	Pre-construction
	v) Monitor signage and fencing	√	√	√	√	√		Project Ecologist	Construction to ongoing works during occupation

**TABLE 1 (Cont.)  
APPLICATION OF MANAGEMENT STRATEGY ACTIONS TO VARIOUS MANAGEMENT AREAS WITHIN RIVERSIDE**

SITE ISSUE	ACTION	APPLICABILITY OF MANAGEMENT ACTION FOR MANAGEMENT AREA						RESPONSIBILITIES	TIMING
		A	B	C	D	E	F		
<b>B12. Monitoring and Reporting Regime</b>	i) Monitor threatened species	√	√	√	√	√	√	Project Ecologist	Pre-construction to ongoing works during occupation
	ii) Monitor native fauna	√	√	√	√	√	√	Project Ecologist	Pre-construction to ongoing works during occupation
	iii) Monitor native vegetation condition	√	√	√	√	√		Project Ecologist	Pre-construction to ongoing works during occupation
	iv) Monitor weeds and rubbish	√	√	√	√	√		Project Ecologist	Pre-construction to ongoing works during occupation
	v) Monitor pest species	√	√	√	√	√		Project Ecologist	Pre-construction to ongoing works during occupation
	vi) Produce regular meaningful reports	√	√	√	√	√	√	Project Ecologist	Pre-construction to ongoing works during occupation
	vii) Review management actions	√	√	√	√	√	√	Project Ecologist Community Title Plan Council	Pre-construction to ongoing works during occupation
	Management Area A – SEPP 14 Wetland Management Area B – Conservation zoned lands Management Area C – Asset Protection Zones/Buffers Management Area D – Wildlife Corridors Management Area E – Drainage Corridors Management Area F – Development Area								

TABLE 2 SPECIES TO BE USED IN REVEGETATION WORKS		
REVEGETATION AREAS "A-PREFIX"		
Open Forest ( <i>Angophora costata</i> , <i>Corymbia gummifera</i> )		
Species		Total Number of Plants*
<b>Trees</b>	<b>Plantings per 100m<sup>2</sup> = 5</b>	
<i>Angophora costata</i> (Smooth-barked Apple)	1.6	
<i>Corymbia gummifera</i> (Red Bloodwood)	1.6	
<i>Eucalyptus microcorys</i> (Tallowwood)	1.6	
<b>Shrubs</b>	<b>Plantings per 100m<sup>2</sup> = 10</b>	
<i>Melaleuca nodosa</i> (Ball Honey Myrtle)	3.3	
<i>Leptospermum polygalifolium</i> (Yellow Tea Tree)	3.3	
<i>Leucopogon lanceolatus</i>	3.3	
<b>Groundcovers</b>	<b>Plantings per 100m<sup>2</sup> = 15</b>	
<i>Lomandra longifolia</i> (Spiky-headed Mat Rush)	3.75	
<i>Themeda australis</i> (kangaroo Grass)	3.75	
<i>Microlaena stipoides</i> (Weeping Rice Grass)	3.75	
<i>Entolasia stricta</i> (Wiry Panic)	3.75	
REVEGETATION AREAS "B-PREFIX"		
Open Forest ( <i>Eucalyptus microcorys</i> )		
Species		Total Number of Plants*
<b>Trees</b>	<b>Plantings per 100m<sup>2</sup> = 5</b>	
<i>Eucalyptus microcorys</i> (Tallowwood)	1.6	
<i>Angophora costata</i> (Smooth-barked Apple)	1.6	
<i>Eucalyptus resinifera</i> (Red Mahogany)	1.6	
<b>Shrubs</b>	<b>Plantings per 100m<sup>2</sup> = 10</b>	
<i>Leptospermum polygalifolium</i> (Yellow Tea Tree)	2.5	
<i>Acacia longifolia</i> var. <i>longifolia</i> (Sydney Golden Wattle)	2.5	
<i>Breynia oblongifolia</i> (Coffee Bush)	2.5	
<i>Callistemon salignus</i> (Willow Bottlebrush)	2.5	

<b>TABLE 2 (Cont.)</b>		
<b>SPECIES TO BE USED IN REVEGETATION WORKS</b>		
<b>REVEGETATION AREAS "B-PREFIX" (Cont.)</b>		
<b>Open Forest (<i>Eucalyptus microcorys</i>)</b>		
<b>Species</b>		<b>Total Number of Plants*</b>
<b>Groundcovers</b>	<b>Plantings per 100m<sup>2</sup> = 15</b>	
<i>Entolasia stricta</i> (Wiry Panic)	3.75	
<i>Lomandra longifolia</i> (Spiky-headed Mat Rush)	3.75	
<i>Imperata cylindrica</i> var. <i>major</i> (Blady Grass)	3.75	
<i>Entolasia stricta</i> (Wiry Panic)	3.75	
<b>REVEGETATION AREAS "C-PREFIX"</b>		
<b>Open Forest (<i>Eucalyptus pilularis</i>)</b>		
<b>Species</b>		<b>Total Number of Plants*</b>
<b>Trees</b>	<b>Plantings per 100m<sup>2</sup> = 5</b>	
<i>Eucalyptus pilularis</i> (Blackbutt)	1	
<i>Angophora costata</i> (Smooth-barked Apple)	1	
<i>Banksia serrata</i> (Old-man Banksia)	1	
<i>Corymbia gummifera</i> (Red Bloodwood)	1	
<i>Eucalyptus robusta</i> (Swamp Mahogany)	1	
<b>Shrubs</b>	<b>Plantings per 100m<sup>2</sup> = 10</b>	
<i>Monotoca elliptica</i> (Tree Broom-heath)	3.33	
<i>Pultenaea villosa</i>	3.33	
<i>Notolaea longifolia</i> (Large Mock Olive)	3.33	
<b>Groundcovers</b>	<b>Plantings per 100m<sup>2</sup> = 15</b>	
<i>Imperata cylindrica</i> var. <i>major</i> (Blady Grass)	5	
<i>Lomandra longifolia</i> (Spiky-headed Mat Rush)	5	
<i>Baloskion tetraphyllum</i> subsp. <i>meiostachyum</i>	5	

TABLE 2 (Cont.) SPECIES TO BE USED IN REVEGETATION WORKS		
REVEGETATION AREAS "D-PREFIX" Woodland ( <i>Eucalyptus resinifera</i> )		
Species		Total Number of Plants*
<b>Trees</b>	<b>Plantings per 100m<sup>2</sup> = 5</b>	
<i>Eucalyptus resinifera</i> (Red Mahogany)	1.25	
<i>Eucalyptus robusta</i> (Swamp Mahogany)	1.25	
<i>Angophora costata</i> (Smooth-barked Apple)	1.25	
<i>Eucalyptus signata</i> (Scribbly Gum)	1.25	
<b>Shrubs</b>	<b>Plantings per 100m<sup>2</sup> = 10</b>	
<i>Melaleuca sieberi</i>	2	
<i>Leptospermum polygalifolium</i> (Yellow Tea Tree)	2	
<i>Melaleuca thymifolia</i>	2	
<i>Leptospermum liversidgei</i>	2	
<i>Callistemon pachyphyllus</i> (Wallum Bottlebrush)	2	
<b>Groundcovers</b>	<b>Plantings per 100m<sup>2</sup> = 15</b>	
<i>Entolasia stricta</i> (Wiry Panic)	3	
<i>Hemarthria uncinata</i> (Matgrass)	3	
<i>Lepyrodia scariosa</i> (Scale Rush)	3	
<i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i>	3	
<i>Aristida benthamii</i>	3	
REVEGETATION AREAS "E-PREFIX" Woodland / Open Forest ( <i>Eucalyptus robusta</i> )		
Species		Total Number of Plants*
<b>Trees</b>	<b>Plantings per 100m<sup>2</sup> = 5</b>	
<i>Eucalyptus robusta</i> (Swamp Mahogany)	2.5	
<i>Melaleuca linifolia</i> (Snow in Summer)	2.5	
<b>Shrubs</b>	<b>Plantings per 100m<sup>2</sup> = 10</b>	
<i>Melaleuca nodosa</i> (Ball Honey Myrtle)	3.33	
<i>Pultenaea villosa</i>	3.33	
<i>Epacris pulchella</i> (NSW Coral Heath)	3.33	

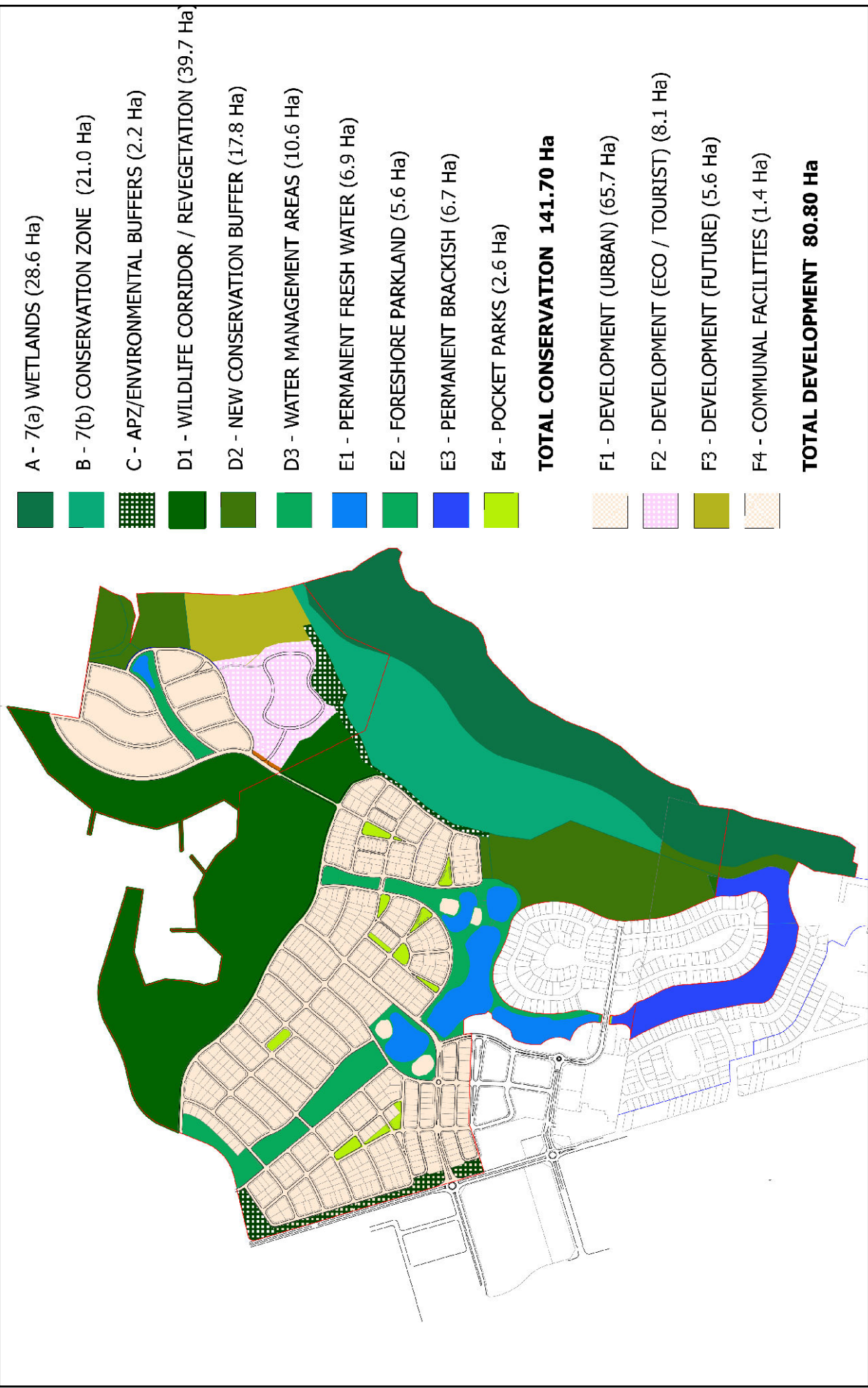


TABLE 2 (Cont.) SPECIES TO BE USED IN REVEGETATION WORKS		
REVEGETATION AREAS "E-PREFIX" (Cont.) Woodland / Open Forest ( <i>Eucalyptus robusta</i> )		
Groundcovers	Plantings per 100m <sup>2</sup> = 15	
<i>Entolasia stricta</i> (Wiry Panic)	3	
<i>Imperata cylindrica</i> var. <i>major</i> (Blady Grass)	3	
<i>Lomandra longifolia</i> (Spiky-headed Mat Rush)	3	
<i>Dianella caerulea</i> var. <i>producta</i> (Blue Flax Lily)	3	
<i>Baloskion tetraphyllum</i> subsp. <i>meiostachyum</i>	3	
REVEGETATION AREAS "F-PREFIX" Woodland / Open Forest ( <i>Eucalyptus umbra</i> )		
Species		Total Number of Plants*
Trees	Plantings per 100m <sup>2</sup> = 5	
<i>Eucalyptus umbra</i> (Broad-leaved White Mahogany)	1	
<i>Eucalyptus globoidea</i> (White Stringybark)	1	
<i>Angophora costata</i> (Smooth-barked Apple)	1	
<i>Corymbia gummifera</i> (Red Bloodwood)	1	
<i>Eucalyptus microcorys</i> (Tallowwood)	1	
Shrubs	Plantings per 100m <sup>2</sup> = 10	
<i>Callistemon salignus</i> (Willow Bottlebrush)	2.5	
<i>Leptospermum polygalifolium</i> (Yellow Tea Tree)	2.5	
<i>Persoonia linearis</i> (Narrow-leaved Geebung)	2.5	
<i>Lomatia silaifolia</i> (Crinkle Bush)	2.5	
Groundcovers	Plantings per 100m <sup>2</sup> = 15	
<i>Entolasia stricta</i> (Wiry Panic)	3	
<i>Imperata cylindrica</i> var. <i>major</i> (Blady Grass)	3	
<i>Lomandra longifolia</i> (Spiky-headed Mat Rush)	3	
<i>Microlaena stipoides</i> (Weeping Rice Grass)	3	
<i>Themeda australis</i> (Kangaroo Grass)	3	

<b>TABLE 2 (Cont.) SPECIES TO BE USED IN REVEGETATION WORKS REVEGETATION AREAS "G-PREFIX" Aquatic Corridor / Parkland</b>		
<b>PARKLAND</b>		
<b>Species</b>		<b>Total Number of Plants</b>
<b>Trees</b>	<b>Plantings per 100m<sup>2</sup> = 1</b>	
<i>Eucalyptus resinifera</i> (Red Mahogany)	0.5	
<i>Eucalyptus robusta</i> (Swamp Mahogany)	0.5	
<b>Shrubs</b>	<b>Plantings per 100m<sup>2</sup> = 2</b>	
<i>Melaleuca sieberi</i>	0.5	
<i>Leptospermum polygalifolium</i> (Yellow Tea Tree)	0.5	
<i>Melaleuca thymifolia</i>	0.5	
<i>Leptospermum liversidgei</i>	0.5	
<b>Groundcovers</b>	<b>Plantings per 100m<sup>2</sup> = 150</b>	
<i>Entolasia marginata</i> (Bordered Panic)	50	
<i>Themeda australis</i> (Kangaroo Grass)	50	
<i>Panicum simile</i> (Two-coloured Panic)	50	
<b>FRESHWATER EDGE</b>		
<b>Species</b>		<b>Total Number of Plants</b>
<b>Trees</b>	<b>Plantings per 100m<sup>2</sup> = 1</b>	
<i>Eucalyptus resinifera</i> (Red Mahogany)	0.5	
<i>Eucalyptus robusta</i> (Swamp Mahogany)	0.5	
<b>Shrubs</b>	<b>Plantings per 100m<sup>2</sup> = 15</b>	
<i>Leptospermum polygalifolium</i> (Yellow Tea Tree)	5	
<i>Melaleuca thymifolia</i>	5	
<i>Leptospermum liversidgei</i>	5	
<b>Groundcovers</b>	<b>Plantings per 100m<sup>2</sup> = 150</b>	
<i>Paspalum distichum</i> (Native Water Couch)	50	
<i>Themeda australis</i> (Kangaroo Grass)	20	
<i>Lomandra longifolia</i> (Spiky-headed Mat-rush)	20	
<i>Dianella caerulea</i> (Blue Flax Lily)	20	
<i>Juncus usitatus</i> (Common Rush)	40	

<b>TABLE 2 (Cont.) SPECIES TO BE USED IN REVEGETATION WORKS REVEGETATION AREAS "G-PREFIX" (Cont.) Aquatic Corridor / Parkland</b>		
<b>FRESHWATER BODY</b>		
<b>Species</b>		<b>Total Number of Plants</b>
<b>Waterplants</b>	<b>Plantings per 100m<sup>2</sup> = 100</b>	
<i>Eleocharis sphacelata</i> (Tall Spike Rush)	20	
<i>Potamogeton crispus</i> (Curly Pondweed)	20	
<i>Triglochin microtuberosum</i> (Water Ribbons)	20	
<i>Ottelia ovalifolia</i> (Swamp Lily)	20	
<i>Vallisneria gigantea</i> (Ribbon Weed)	20	
<b>SALINE SHORE</b>		
<b>Species</b>		<b>Total Number of Plants</b>
<b>Halophiles</b>	<b>Plantings per 100m<sup>2</sup> = 60</b>	
<i>Juncus kraussii</i> (Sea Rush)	20	
<i>Sarcocornia quinqueflora</i> (Glasswort)	20	
<i>Spinifex sericeus</i>	20	

\* Numbers may change subject to the existing on-ground presence of native trees, shrubs or groundcovers.




Plan for indicative purposes only not for detailed measurement. Subject site boundary subject to final survey.



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N 

0 100 200 300 400 500 m

Approximate at A4

Original plan produced in A4 colour

Drawing No.	11118	Date	
Drawn By	DC	Date	01/12/11
Amendment		Date	
	A		
	B		
	C		

**Figure 1.1**  
**Site Management Zones**  
Riverside, Tea Gardens  
Source: Cighton Properties 2011



Flora survey locations are approximate and have not been fixed by land survey. \*Subject Site boundary subject to final survey.  
Plan for indicative purposes only. Not for detailed measurement. Original plan produced in A3 colour

### Future Revegetated Types

Subject Site Boundary	RA/A Aquatic / Dam Areas	RA/D Pasture with Scattered Trees	RA/G Woodland / Open Forest (E. umbra)
	RA/B Open Forest (E. microcorys)	RA/E Woodland (E. resinifera)	
	RA/C Open Forest (E. pilularis)	RA/F Woodland / Open Forest (E. robusta)	



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**Figure 2**  
**Re-vegetation Areas**  
**Riverside, Teagardens**

Source: Aerial © Department of Lands (2007)

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