BIODIVERSITY | BUSHFIRE | ARBORICULTURE

NEWCASTLE SYDNEY

# Biodiversity Management Plan – Retained Land

## Lots 1 & 2 DP1299958 – 20 & 20A Cantwell Road, Lochinvar, NSW

**Prepared For:** Trustee of the Roman Catholic Church for the Diocese of Maitland Newcastle

c/- Monteath & Powys

**Prepared By:** Anderson Environment and Planning

**Date:** February 2025

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**Cover Photo: Riparian area of creek on Subject Site**

## Document Control

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## Distribution

| Revision | Date | Name | Organisation |
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| 00 | 23/10/2024 | Chad Beecham | Trustee of the Roman Catholic Church for the Diocese of Maitland Newcastle C/- Monteath & Powys |
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# 1.0 Introduction

Anderson Environment & Planning (AEP) have undertaken the necessary investigations to inform the production of a Biodiversity Management Plan (BMP) for the retained C3 - Environmental Management land located within Lots 1 & 2 DP1299958 –20 & 20A Cantwell Road, Lochinvar, NSW (the Subject Site).

This Biodiversity Management Plan (BMP) covers the management of retained vegetation within the Subject Site.

## 1.1 Biodiversity Management Plan Objectives

The aim of this BMP is to schedule weed management, planting and other measures necessary to enhance the vegetation present onsite. The successive stages of regeneration are applicable to ensure that the targets and objectives are achieved over the 5-year duration of the BMP and to minimise maintenance into the future.

This BMP incorporates best practices in bushland restoration, management of invasive species and revegetation in order to achieve the following objectives within the 5 years:

- Regenerate physical and biological functions of the remnant bushland present within the BMP Lands to improve habitat values and landscape connectivity;
- Enable natural and facilitated regeneration where appropriate, ensuring the structural and trophic complexity of the vegetation community is adequately represented;
- Develop management actions using the 'SMART' goals approach (Specific, Measurable, Achievable, Reasonable and Time specific);
- Ensure the site is maintained until vegetation in rehabilitated areas achieves a resilient and self-sustaining state; and

The overarching goal of this plan is to manage the retained vegetation for biodiversity conservation as part of the avoid and minimize strategy for the proposed development.

## 1.2 Document Referencing

In preparing this plan, reference has been made to the following documents:

- Anderson Environment & Planning (2025) Aquatic Ecology Assessment Report for 20 & 20A Cantwell Road and 60 New England Highway, Lochinvar NSW;
- Anderson Environment & Planning (2025) Waterfront Land Assessment Report for 20 & 20A Cantwell Road and 60 New England Highway, Lochinvar NSW; and
- Anderson Environment & Planning (2025) Streamlined Biodiversity Development Assessment Report for Staged Subdivision at for 20 & 20A Cantwell Road and 60 New England Highway, Lochinvar NSW.

For the purposes of referencing, this document should be cited as:

- Anderson Environment & Planning (2025). Biodiversity Management Plan for 20 & 20A Cantwell Road, Lochinvar, NSW.

## 1.3 About this Plan

This BMP is a comprehensive report developed to provide management for Flora, Fauna and water over the Subject Site for 5 (five) years. To allow for a concise and easily referable plan, the BMP has been divided into sections, which function cohesively together and as separate Plans:

- Section 1 – Introduction – provides information on objectives and referencing material;

- Section 2 – Site Context and Existing Condition – provides detailed information on the BMP lands and ground-truthed condition;
- Section 3 – Regeneration Approach and Targets – outlines the approach to revegetate the BMP Lands, including methodology and targets over the 5 years to achieve a Naturally Regenerating Site;
- Section 4 – Site Preparation – outlines the procedure to prepare the BMP Lands for management and the surrounding process to protect this land from surrounding development.
- Section 5 – Implementation of Regeneration – this section of the report outlines the specific Management Zone strategies for regeneration and schedule of works.
- Section 6 – Project Management – this section of the Plan addresses qualifications, monitoring and reporting procedures.

## 1.4 Commencement of BMP

The BMP will commence once the civil works required for the rehabilitation of the bank and installation of the culvert and associated civil works are completed. The BMP does not provide any information, on the design or management of these civil works, this is to be prepared by a suitable qualified Engineer.

The actions outlined within the BMP are for regeneration purposes such as weeding, planting, mulching, watering and monitoring.

From commencement of the BMP the Project Ecologist and Bush Regeneration Contractor in consultation with the Civil Works Contractor will undertake the required actions to ensure a naturally regenerating community is achieved.

# 2.0 Site Context and Existing Condition

## 2.1 Local context

The Subject Site largely contains C3 Environmental Management Zoned land forming the riparian corridor through land at 20 and 20A Cantwell Road, Lochinvar, NSW within the Maitland City Council Local Government Area (LGA).

An unnamed creek runs through the centre of the C3 zoned lands and feeds into Lochinvar Creek (see **Aquatic Assessment Report and Waterfront Land Assessment Report**).

The broader Study Area has varied land uses, rural, residential, educational and the New England Highway.

The proposal will regenerate approximately 2.3ha of native vegetation which provides both core habitat and landscape connectivity for a number of native fauna species including fish in the area. **Figure 1** shows the site location.

## 2.2 Biodiversity Management Plan Lands

**Figure 1** shows the location and area of the Biodiversity Management Plan Land (BMP Lands) where this report applies. The remainder of the C3 Zoned land will be managed under a Landscape Plan and a proposed road crossing.

## 2.3 Vegetation Descriptions

Remnant vegetation present within Lots 1 & 2 DP1299958 has been assessed using six (6) BAM plots as a part of the **Streamlined Biodiversity Assessment Report**. Remnant native vegetation within the BMP lands is composed of one distinct Plant Community Type (PCT):

- PCT 4023 - Coastal Valleys Riparian Forest (0.11ha).

The location of remnant PCT 4023 within the BMP Lands is presented in **Figure 2**. The PCT has been further segregated into management Zones (MZs) according to vegetation conditions as described in **Section 3.2** below.

### 2.3.1 PCT 4023 - Coastal Valleys Riparian Forest

PCT 4023 is located in patches along the creek. This zone contains an area of *Casuarina glauca* canopy and 3 small areas dominated by *Typha orientalis* without canopy.

Other ground stratum species include *Centella asiatica, Commelina spp., Einadia nutans subsp. linifolia, Lepidium spp., Lobelia concolor, Oxalis perennans, Persicaria decipiens, Rumex brownii Cynodon dactylon, Juncus usitatus, Typha orientalis, Bolboschoenus caldwellii, Machaerina juncea, Bothriochloa macra, Microlaena stipoides, Panicum effusum var. simile, Sporobolus creber.*

PCT 4023 is found onsite in two condition categories due to disturbance associated with cattle grazing; with canopy and without canopy.

**Vegetation Condition**

Overall, the vegetation condition is considered to be poor throughout the BMP Lands. Non native pasture species are present in high densities with the majority of the site too degraded to ascribe a PCT.

Four (4) priority weeds of the Hunter are present; *Cestrum parqui* (Green cestrum), *Juncus acutus subsp. acutus* (Sharp Rush), *Opuntia stricta* (Common pear), *Senecio madagascariensis* (Fireweed). Five (5) High Threat Weeds (HTW), *Ehrharta erecta, Olea europaea, Paspalum dilatatum, Senecio madagascariensis* are also present.

Several exotic shrubs, grasses and herbaceous weeds occur throughout the site, including *Amaranthus spp., Aster subulatus, Cardamine flexuosa, Cardamine hirsuta, Cirsium vulgare, Conyza bonariensis, Daucus carota, Rumex spp., Gamochaeta americana, Hypochaeris radicata, Juncus cognatus, Anagallis arvensis subsp. arvensis, Medicago polymorpha var. vulgaris, Nothoscordum gracile, Onopordum acanthium, Plantago lanceolata, Poa annua, Ranunculus scleratus, Rumex crispus, Setaria geniculata, Setaria glauca, Sida rhombifolia, Solanum americanum, Solanum nigrum, Soliva pterosperma, Sporobolus africanus, Stellaria media, Trifolium repens, Verbena bonariensis, Verbena brasiliensis.* Weed density mapping is provided in **Figure 3**.

### 2.3.2 PCT 4023 – Poor – with Canopy & Poor – Groundcover Only

Areas of PCT 4023 in poor condition with existing canopy. These have a high influence of edge effects associated with continued disturbance. Weed densities are high and include *Cestrum parqui, Ehrharta erecta, Olea europaea and Paspalum dilatatum.*

Areas of PCT 4023 in Poor condition without canopy have a high influence of edge effects associated with continued disturbance. Weed densities are high and include *Juncus acutus, Paspalum dilatatum, Senecio madagascariensis* and *Sporobolus africanus.*

## 2.4 Aquatic Description

The unnamed upper tributary of Lochinvar Creek is in a highly degraded condition, with bed and bank erosion, limited to no native aquatic flora or riparian vegetation, two crossings blocking fish passage and portions have been used to dispose of vegetation material.

The agricultural land use has caused severe degradation of the creek


AEP

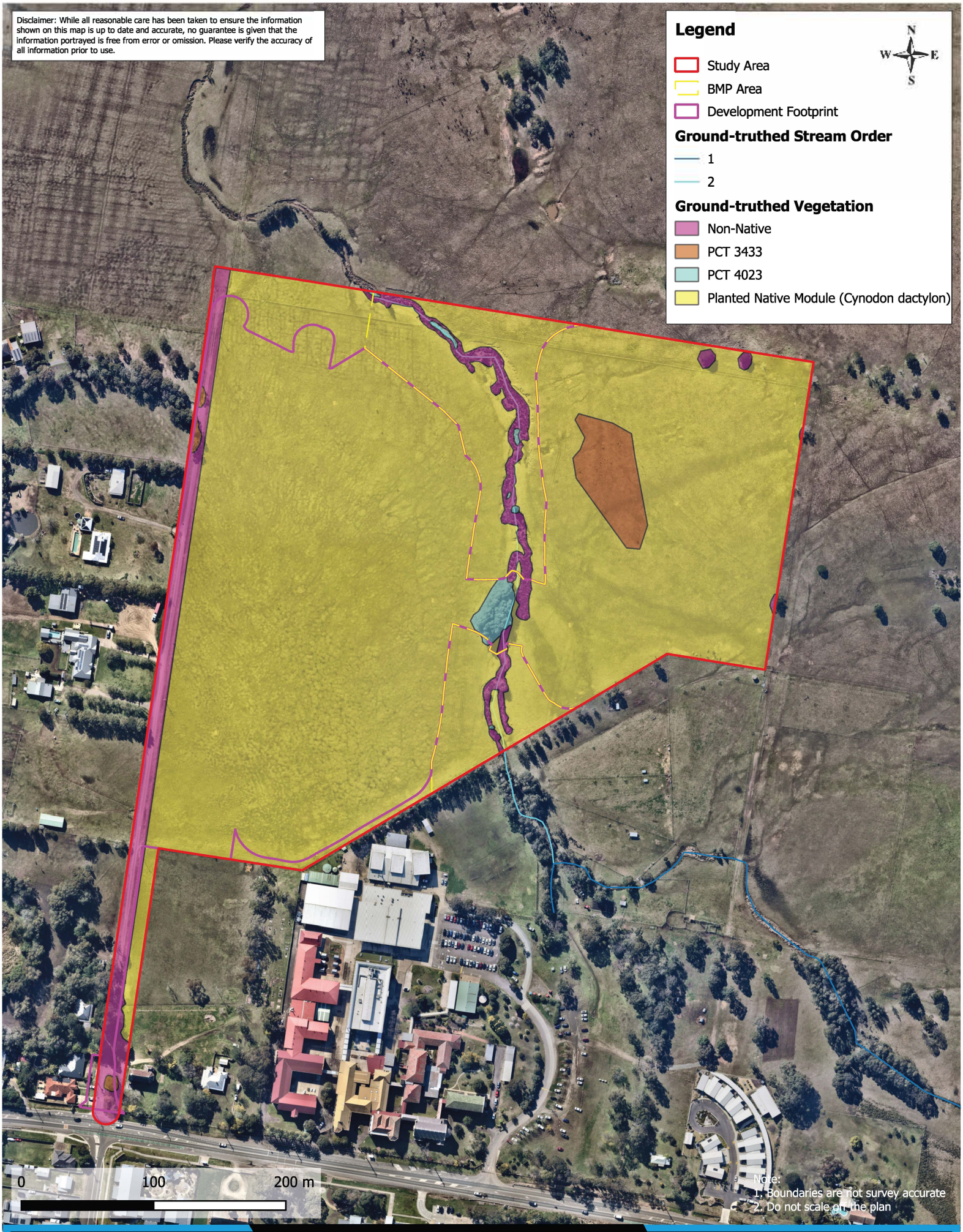
Figure 1 - Site Location

Date: January 2025

Location: 20 &20A Cantwell Road, Lochinvar NSW

Client: CDMN

AEP ref: 4951




AEP

Figure 2 - Ground-truthed Vegetation

Date: January 2025

Location: 20 & 20A Cantwell Road, Lochinvar NSW

Client: CDMN

AEP ref: 4951

# 3.0 Regeneration Approach and Targets

Regeneration of the BMP lands will be undertaken over a period of 5 years. Management of the site will be undertaken to ensure compliance with the *Biosecurity Act 2015*.

Regeneration of the BMP Lands will aim to reach a state of "Natural Regeneration" requiring minimal to no intervention. To achieve this, an Integrated Regeneration Approach has been designed, with key elements and targets identified for each vegetation community within each Management Zone.

It is anticipated that after the 5-year duration of the BMP, the vegetation present will be in a state of natural regeneration and will be self-sustaining only requiring a low level of maintenance to address sporadic weed incursions.

## 3.1 Integrated Regeneration Approach for BMP Lands

Regeneration of the BMP lands will be undertaken by utilising where possible the principles of the *Society for Ecological Restoration Australasia* (2021) *National standards for the practice of ecological restoration in Australia Edition 2.2*. An ecological regeneration approach has been deemed suitable for the BMP lands. This approach utilises three integrated restoration techniques to achieve the goal of a Natural Regenerating ecosystem and include:

- Reconstruction Approach;
- Facilitated Regeneration Approach; and
- Natural Regeneration.

National Guidelines assigned to BMP Land areas are based on their history of disturbance and current state. Due to the highly disturbed nature of the site, the Reconstruction Approach will be utilised within the BMP lands with the aim of achieving a state of Natural Regeneration by the end of the BMP period.

### 3.1.1 Reconstruction Approach

This approach is used across sites where the vegetation condition is poor, generally due to a range of causes of degradation that have led to partial or total damage to biotic and abiotic factors. The Reconstruction Approach includes:

- Primary weeding;
- Installation of jute matting and coir logs in areas of high water-flow;
- Mulching in areas without jute matting;
- Planting of tree, shrub and ground species in appropriate areas;
- Installation of guards around tree and shrub species;
- Watering;
- Secondary weeding;
- Maintenance watering;
- Maintenance of tree guards; and
- Replacement of dead plants.

This approach is proposed to be used extensively across the BMP area due to the low instance of native vegetation and eroded nature of the stream banks.

### 3.1.2 Facilitated Regeneration Approach

This approach is generally used on sites where regeneration progress is at an intermediate level and active intervention is minimised.

As stated, the Facilitated Regeneration Approach requires active interventions which are determined by the Bush Regeneration Contractor (BRC) and may involve the following tasks:

- Weeding;
- Planting where appropriate;
- Installation of plant guards;
- Watering;
- Replacement of dead plants;
- Maintenance of tree guards;
- Watering.

It is expected works can move into this approach at the end of year 1 after primary works have been completed using the Reconstruction approach.

### 3.1.3 Natural Regeneration Approach

This approach is used where disturbance and weed cover are relatively low, and pre-existing biota should be able to recover after cessation of degrading practices or when recovery with assistance has reached a stage where intervention is minimal.

The Natural Regeneration Approach requires limited to no interventions with weeding being the only task undertaken to encourage continual natural regeneration.

The majority of the BMP Lands will require significant works and maintenance before this approach can be used due to lack of canopy and high problematic weed loads. It is expected that the BMP lands will reach a stage where this approach is appropriate by the end of year 4.

## 3.2 Management Zones

The BMP lands have been segregated into four (4) Management Zones (MZs) according to management strategy necessary to achieve the objectives of this BMP. The location of each vegetation zone is presented in **Figure 3**.

- Management Zone 1 (MZ1): Aquatic Zone Reconstruction,
- Management Zone 2 (MZ2): PCT 4023 – Flood Zone Reconstruction Batter;
- Management Zone 3 (MZ3): PCT 4023 – Riparian Reconstruction Forest; and
- Management Zone 4 (MZ4): PCT 4023 – Riparian Reconstruction Woodland.

Weed densities are based on weed mapping conducted in 2024. Weed densities are subject to change over time. Baseline monitoring will establish updated weed densities for each MZ. This data will be used to adjust the relevant restoration techniques for each MZ. Management actions specific to each MZ are detailed in the following sections.

**Plate 1** shows a cross section of watercourse to assist with the location of each zone.

A review of the current literature showed that reinstating a natural channel within the creek would ensure key features are present within the creek, and result in improved water quality and habitat for terrestrial and aquatic organisms. **Plate 2** shows an example of a natural channel design.

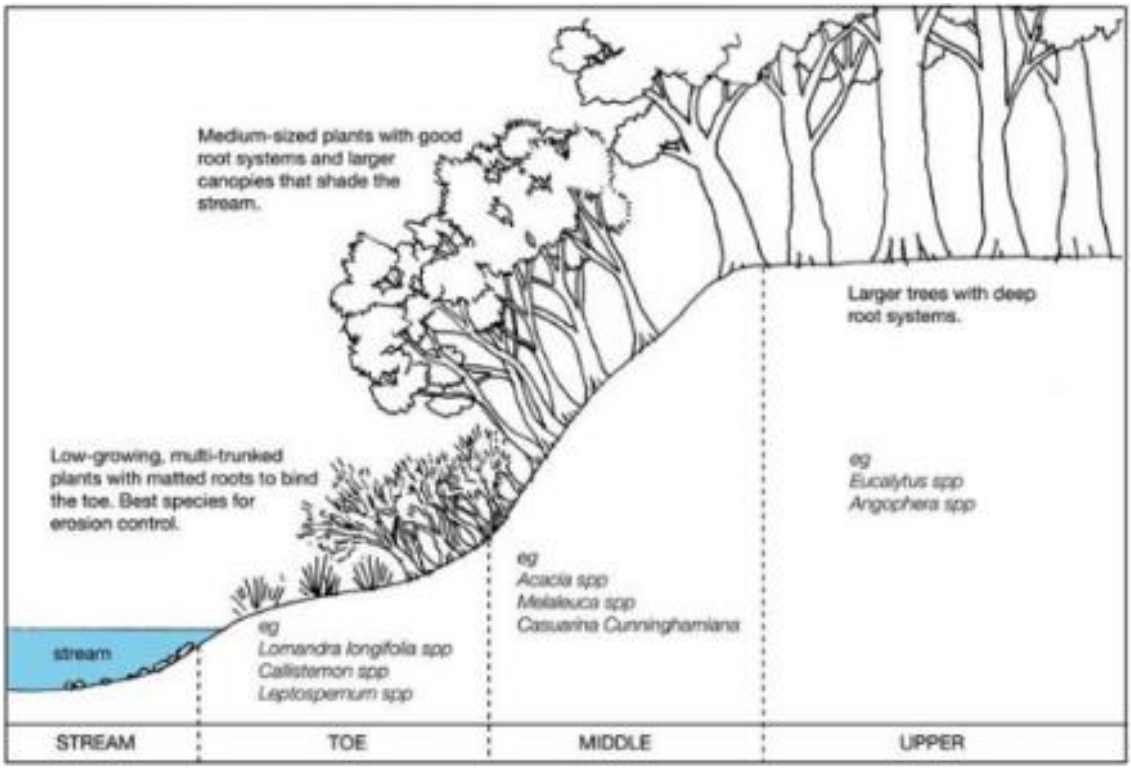



**Plate 1 - Cross Section of Riparian Corridor (NSW Water, 2022).**

**Plate 2 – Bundamba Creek Regeneration works (Australian Wetland Consulting, 2018)**

This BMP provides the concept plan for the channel design, detailed engineering plans should be prepared prior to guide construction.

### 3.2.1 Restoration of Natural Channel

Heavy erosion along the bank of the northern section of the watercourse is present. In order to restore the function of the stream, a vegetated batter will be implemented to reduce the impacts of erosion and sedimentation. Surrounding road infrastructure may be visually integrated into the surrounding landscape with the aid of vegetated batters, which can also have positive environmental effects (e.g., erosion management, improve biodiversity and visual amenity, increase canopy cover, and provide habitat).

### 3.2.2 Establishment of aquatic vegetation

Health and function of the stream and its associated riparian corridor has been assessed by AEP in an **Aquatic Ecology assessment** and **Waterfront Land Assessment**. These reports have been used to inform this BMP. In order to improve aquatic habitat within the creek, native vegetation should be re-established as soon as practical within the channel.

Macrophyte species have been identified as suitable due to being identified within the other riparian corridors present onsite. They include species such as *Juncus usitatus, Baumea juncea, Lomandra longifolia* and *Persicaria decipiens.* A full species list for revegetation is provided in **Appendix B**.

### 3.2.3 Re-snagging

As a part of this BMP, some reconstruction works within the creek waters will be required, including the removal of two blockages from rudimentary creek crossings and the installation of a minimum of five (5) snags installed using native trees either won from clearing or sourced from off site. Snags should be introduced to existing pools within the section of the Lochinvar Creek tributary that crosses the BMP lands following guidelines from DEW (2021):

- Prior to removal of blockages and re-snagging there will be a stream diversion put in place to allow for installation of the culvert without stopping water flow.
- The timing of any works should be during a period of low rainfall and low flow in the creek, if possible, such as winter and planned so as not to interfere with the possible migration of fish within the waterway.
- Temporary blockages should not be placed within a waterway during the months of September to March, if possible, as this period is generally when native fish are moving to spawn or recruit within NSW waters;
- Access requirements should be identified for the works points to minimise disturbance to bed and banks;
- Provisions to protect fish during the dewatering process of any coffer dams or the clearing of screens. These should include:
    - discharging water into a bunded or screened site to allow fish to be rescued,
    - any fish caught in the dewatering process must be immediately released upstream (fish will want to continue migrating upstream) of the site,
    - pumps and screens must be of a suitable capacity and size, and pump velocities slow enough, to allow fish to escape during the dewatering process.
- Preferred sites for the stockpiling of fill or excavated materials on flood prone lands should be secure from a 1 in 10-year flood and have effective sediment control measures in place to contain any runoff in order to avoid sedimentation;

- Snags should be installed as a priority before mulching, erosion control or planting takes place to prevent damage to other works;
- Position timber at a 45 degrees angle in a downstream direction from the edge of the bank with the base (or root wad) of the snag placed closely against the bank; and
- Once positioned, the structure must be pinned to secure it in the desired position or secured in a method that will not move or impact downstream river users.
- Any fill required during reclamation works must consist of only natural material. Contaminated material, tyres, building and demolition rubble or acid sulphate soils (ASS) should not be used as fill in any aquatic environment.

**Plate 3** provides an example configuration.

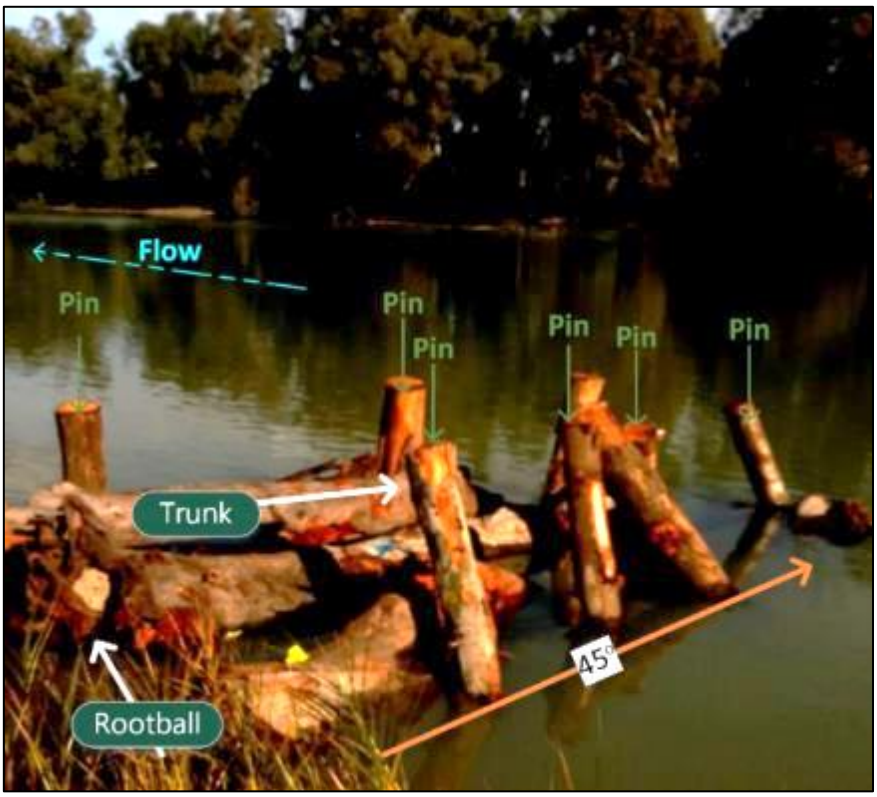



**Plate 3 – Re-snagging Guidelines for the Lower River Murray (DEW Technical Report 2021)**

The most suitable timber for re-snagging is native Australian hardwood which has been recently legally felled. Exotic trees felled as part of the proposal should not be used due to the potential for invasive species to propagate downstream.

### 3.2.4 MZ1: PCT 4023 – Aquatic Zone Reconstruction

This zone covers all areas within the stream which are shallow enough for planting of macrophytes throughout the BMP area. The existing creek exhibits the geomorphological features of a significant watercourse such as defined bed and bank, pools, riffles and meanders. There are no snags present however, so these will require installation see **section 3.2.2.** The majority of this zone is in poor condition, with moderate to high weed density. *Juncus acutus* (Sharp Rush) occurs extensively within this zone. *Typha orientalis*, although native, will require control to facilitate fish movement in the stream. Canopy trees planted will eventually provide shade which will discourage its growth.

The composition of this zone is poor with few native species present. As such, the Reconstruction Approach has been allocated to MZ1.

Work to be undertaken in MZ1 include;

- Primary weeding;
- Installation of instream snags;
- Secondary weeding;
- Planting of macrophytes; and
- Maintenance weeding.

**Weed Control**

It is proposed that weed control works in this area are coordinated with culvert installation when water flow in the creek is either redirected or stopped. *J. acutus* is the most problematic weed in this zone and the most effective control technique is spraying with herbicide, however this can't be done while water is in the creek due to potential harm to fish and frogs. This makes the period of flow control an excellent opportunity for weed control. Alternatively, a period without rain may provide the same conditions. Mechanical removal of *J. acutus* is not recommended due to soil disturbance being a trigger for germination of seed already in the soil. It is proposed that this area is traversed regularly targeting all weeds present to prevent new weeds becoming established.

- Several attempts at control of *J. acutus* may be required to ensure complete removal;
- Soil disturbance should be avoided where possible;
- Planting should take place after primary *J. acutus* control is finished.

## MZ2: PCT 4023 – Flood Zone Reconstruction Batter

This zone is located on the north eastern side of the unnamed creek. The area to the east of the proposed batter has had extensive erosion, as a result of land clearing and erosive rill soils. AEP had a site inspection with the engineering team to determine how to rehabilitate this section of bank and stop the erosion. A soft design of a vegetated batter and filling of the erosion has been designed to ensure the rill erosion is prevented from spreading further in the floodplain.

The composition of this zone is poor with few native species present. As such, the Reconstruction Approach has been allocated to MZ2.

Bank stabilisation measures should be implemented during removal of blockages and construction of the of the culvert while water flow is being controlled to minimise erosion risk. Due to periodic flooding of the area mulching is not appropriate in MZ2 so jute matting and coir logs are recommended where erosion control is needed.

Work to be undertaken in MZ2 include;

- Rubbish removal;
- Primary weeding;
- Secondary weeding;
- Installation of batter and filling of rill erosion;
- Installation of jute matting and coir logs;
- Planting with native trees, shrubs, grasses and forbs from PCT 4023;
- Installation of plant guards on shrub and canopy species;
- Maintenance weeding; and
- Replacement of dead plants and maintenance of plant guards.

**Weed Control**

It is proposed that weed control works in this area are coordinated with culvert installation when water flow in the creek is either redirected or stopped. *J. acutus* is the most problematic weed in this zone and the most effective control technique is spraying with herbicide, however this can't be done over water due to potential harm to fish and frogs. This makes the period of flow control an excellent opportunity for weed control. Alternatively, a period without rain may provide the same conditions. Mechanical removal of *J. acutus* is not recommended due to soil disturbance being a trigger for germination of seed already in the soil and leaving them in-situ will help provide stability until planted species are established. It is proposed that this area is traversed regularly targeting all weeds present to prevent new weeds becoming established.

- Several attempts at control of *J. acutus* may be required to ensure complete removal;
- Soil disturbance should be avoided where possible; and
- Planting should take place after primary *J. acutus* control is finished.

**Revegetation**

Planting should consist of species which are suited to periodic inundation and which will capture sediment and provide soil stability. Canopy species should be planted close to the creek to facilitate shading the water to reduce stream blockage from *Typha orientalis.* This zone is to be densely planted to represent a forest vegetation formation. A plant list for revegetation is provided in **Appendix B**.

### 3.2.5 MZ3 – PCT 4023 Riparian Reconstruction Forest – Reconstruction

This management zone is located in the inner (10m) Vegetation Riparian Zone buffer from top of bank out to 10m. Weed density is moderate with only scattered occurrences of problem weeds. The inner 10m will be densely planted with PCT 4023.

Work to be undertaken in MZ3 include;

- Primary weeding;
- Secondary weeding;
- Spreading mulch mixed with native seed;
- Densely planted trees, shrubs, grasses and forbs from PCT 4023;
- Installation of plant guards on shrub and canopy species;
- Maintenance weeding; and
- Replacement of dead plants and maintenance of plant guards.

**Weed Control**

It is proposed that this area is regularly traversed to control any occurrence of weeds such as *Paspalum dilatatum* which may compete with planted natives. Mulching after secondary weeding will prevent reestablishment of weeds. Note that this management zone will be directly adjacent to the future development and as such, it is likely to impacted by ongoing edge effects. Therefore, the urban bushland interface should be carefully maintained to identify quickly any new weed occurrence and respond in a timely manner to prevent encroachment in the wider Subject Site.

- Herbicide may be used at the discretion of the bush regeneration contractor if deemed necessary and posing low risk to surrounding vegetation from off-target spray.

**Sediment control**

As mentioned in the **Aquatic Assessment**, The Prosser and Karssies guidelines on designing filter strips has been considered and the required soil capture will be made possible within the native VRZ

through dense planting of native rushes, grasses and forbs along the urban bushland interface. An additional grass filter strip will not be necessary considering the low gradient of the land The proposed land use without soil tillage will not create loose soil in need of capture which is the main function of filter strips.

**Revegetation**

Planting is recommended to be dense along the urban bushland interface to discourage public traffic and capture sediment in urban runoff. A plant list for revegetation is provided in **Appendix B**.

### 3.2.6 MZ4: PCT 4023 Riparian Reconstruction Woodland

This zone covers the outer 10m VRZ and additional areas within the BMP Lands. This area is to be planted in a woodland density to ensure the Safer by Design principles are met. The woodland formation will provide a wildlife corridor with mixes of canopy trees and shrubs while allowing for sightlines to reduce undesirable behaviour. Such vegetation will also provide improved catchment health by dispersing over land flows, allowing for groundwater infiltration and nutrient absorption, creating a buffer between the proposed development and MZ2. The majority of this zone is in poor condition, with moderate to high weed density. There is currently grazed agricultural land surrounding the riparian area.

The composition of this zone is poor with few native species present. As such, the Reconstruction Approach has been allocated to MZ4.

Work to be undertaken in MZ4 include;

- Rubbish removal;
- Primary weeding;
- Secondary weeding;
- Installation of erosion control where appropriate including jute matting and coir logs;
- Planting with native trees, shrubs, grasses and forbs from PCT 4023 in a woodland formation;
- Installation of plant guards on shrub and canopy species;
- Maintenance weeding; and
- Replacement of dead plants and maintenance of plant guards.

**Weed Control**

It is proposed that this area is regularly traversed to control any occurrence of weeds such as *Paspalum dilatatum* which may compete with planted natives. Mulching after secondary weeding will prevent reestablishment of weeds. Note that this management zone will be directly adjacent to the future development and as such, it is likely to impacted by ongoing edge effects. Therefore, the urban bushland interface should be carefully maintained to identify quickly any new weed occurrence and respond in a timely manner to prevent encroachment in the wider Subject Site.

- Herbicide may be used at the discretion of the bush regeneration contractor if deemed necessary and posing low risk to surrounding vegetation from off-target spray.

**Revegetation**

Planting should consist of species which are suited to periodic inundation and which will capture sediment and provide soil stability. Planting with native trees, shrubs, grasses and forbs from PCT 4023 in a woodland formation. A plant list for revegetation is provided in **Appendix B**.

# 4.0 Ecosystem Targets

*"Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed.* (SER 2021)*"*

The overall target for the BMP Lands is to establish a naturally regenerating community that provides habitat for foraging, roosting and nesting for species associated with the PCT 4023 - Coastal Valleys Riparian Forest and the local region.

There are many ways to generate targets and establish measure tools to determine the health of an ecosystem such as:

- Benchmark conditions set under the Biodiversity Assessment Method 2020;
- Percentage of species presence from community list per as a whole or per stratum;
- Species composition;
- Physical condition;
- Absence or presence of threats;
- Structural diversity;
- Coverage of the flora species;
- Diversity of fauna gilds present; and
- Abundance of fauna recorded within the subject site.

AEP acknowledges that all of the above are valid assessment tools to utilise and measure success, however there are several factors that limit all communities from reaching Benchmark Conditions:

- Availability to purchase seed or tube stock of many native species;
- Topographic features of each site vary;
- Aspect of BMP lands variation between sites;
- Accessibility / connectivity for mobile fauna to access and use the site;
- Soil types;
- Surrounding vegetation communities influence the seed stock and hence natural regeneration;
- Presence or absence of canopy, impacting the microclimates;
- Rainfall variation; and
- Growth timeframes.

When developing targets for BMP Lands the above must be taken into consideration without losing the main objective to *assist the recovery of an ecosystem.* Therefore, AEP has developed targets (refer to **Table 1**) for Reconstruction Approach that will achieve a naturally regenerating functioning ecosystem, within the timeframes outlined in the BMP.

Utilising ecological references to identify the particular terrestrial or aquatic ecosystem and inform the targets of a regeneration project involves describing the specific compositional, structural and functional ecosystem attributes requiring reinstatement, before the desired outcome, "*assist the recovery of an ecosystem",* can be said to have been achieved. These attributes in combination can then be used to derive the targets for a BMP. A restored state is considered to have been achieved when an ecosystem is naturally regenerating.

### 4.1.1 BMP Land Targets

The Integrated Regeneration Approach will be used across the entire BMP Lands and the following targets have been designed to be specific, measurable, achievable, reasonable and time bound (SMART), providing qualitative data within the BMP Lands.

Given the current degraded condition of the BMP Lands the focus is on weed removal then reconstruction through planting and native seed mixed into the mulch, which in turn will promote the growth of native vegetation from seed brought in by mobile fauna.

**Tables 1** to **3** outline the targets the BMP is aiming for each attribute within the BMP Lands.

Surveys undertaken by AEP showed vegetation present to be in poor condition requiring the reconstruction approach to regeneration:

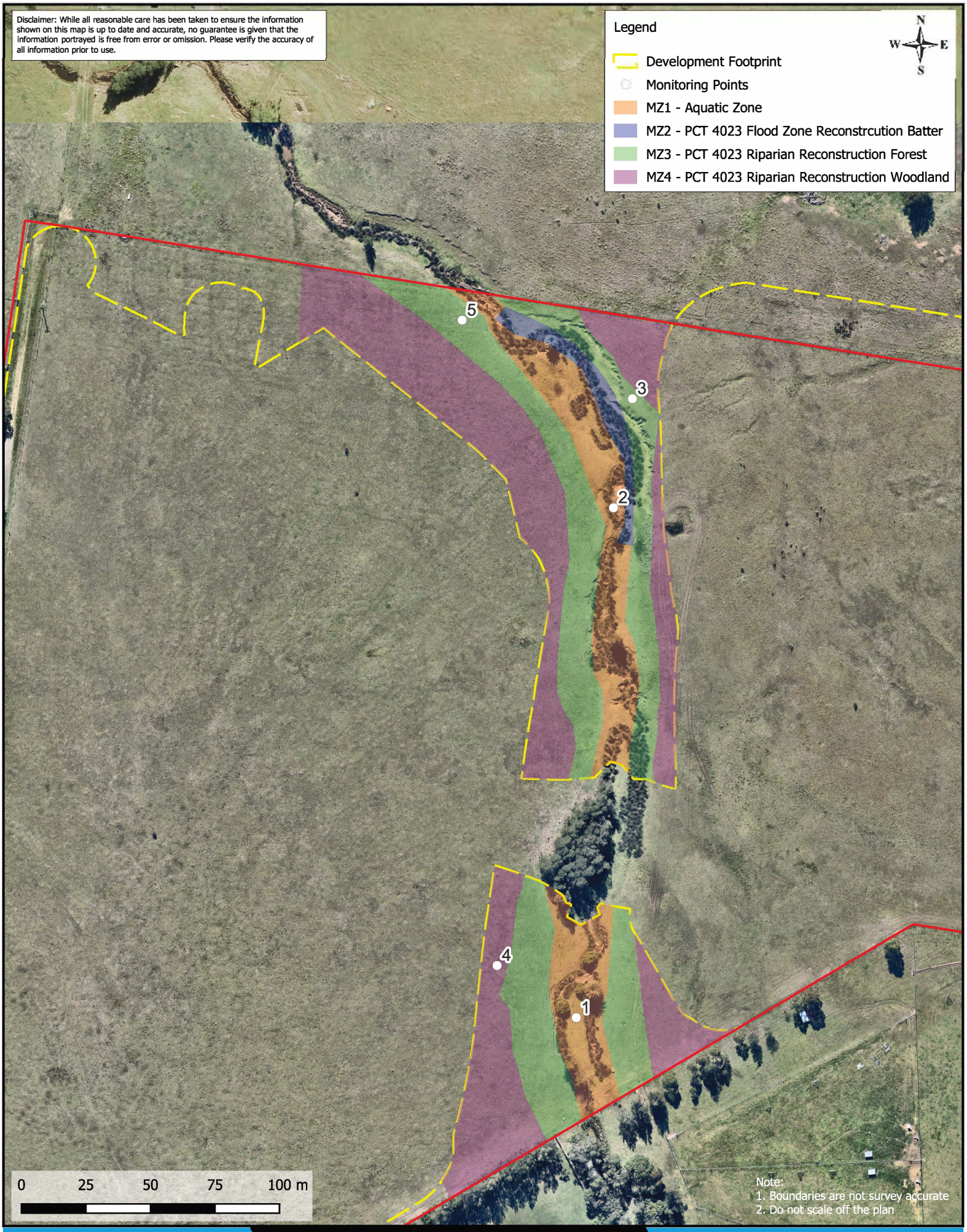
- **Management Zones 1, 2, 3,** and **5** were considered to be in poor condition requiring regeneration based on Reconstruction Approach. Targets are outlined in **Table 1**

As stated above the condition of vegetation communities can vary significantly and as such baseline data will be collected to determine the targets for each of the Management Zones within the BMP Lands. The baseline report will be prepared at commencement of the BMP and submitted to Council outlining the specific targets for each zone, based on **Tables 1.**

**Table 1 – Regeneration Targets for Reconstruction Approach**

| Attribute | Baseline Data | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|---|---|
| **Approximate Timeframe from Commencement** | **Commencement** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** |
| **Species composition** | At each monitoring point collect:<br>• Native Species abundance<br>• Native Species Cover<br>• Weed / exotic Species abundance<br>• Weed / exotic Species Cover | • 90% survival of each planted stratum.<br>• 80% reduction in weeds from baseline data. | • 80% survival of each planted stratum.<br>• 85% reduction in weeds from baseline data. | • 80% survival of each planted stratum.<br>• 85% reduction in weeds from baseline data. | • 80% survival of each planted stratum.<br>• 95% reduction in weeds from baseline data. | • 80% survival of each planted stratum.<br>• 95% reduction in weeds from baseline data. |
| **Structural diversity** | Record the native growth forms present:<br>• Tree;<br>• Shrub;<br>• Grass / grass like;<br>• Forb;<br>• Fern; and<br>• Other. | Due to minimal native species present and low potential for regeneration from soil seedbank or faunal reintroduction, structure and growth form complexity will be planted in year one. | Maintain or improve on diversity in all growth forms recorded after planting. | Maintain or improve on diversity in all growth forms recorded after planting. | Maintain or improve on diversity in all growth forms recorded after planting. | Maintain or improve on diversity in all growth forms recorded after planting. |
| **Ecosystem Function** | Habitat baseline recorded | Ground and in-stream habitat installed. Tube stock planted. | No decline in ground habitat (replace if removed or damaged) | 5% increase in ground habitat through planting growth (replace if removed or damaged) | 10% increase in ground habitat through planting growth (replace if removed or damaged)) | 20% increase in ground habitat through planting growth (replace if removed or damaged) |

| Attribute | Baseline Data | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---|---|---|---|---|---|---|
| **Approximate Timeframe from Commencement** | **Commencement** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** |
| | Stem classes present | No increase required as tube stock planted. | No increase required as tube stock planted. | No increase required as tube stock planted. | No increase required as tube stock planted. | 2 -10% increase in stem class presence from baseline data |




AEP

Figure 3 - Management Zones and Monitoring Points

Date: January 2025

Location: 20 &20A Cantwell Road Lochinvar NSW

Client: CDMN

AEP ref: 4951

# 5.0 Site Preparation

Prior to the commencement of regeneration, the BMP Lands must be prepared. The following works have been recommended to assist in site preparation.

## 5.1 Fencing

The boundary between the development site and BMP lands should be identified by a surveyor in conjunction with the Project Ecologist and subsequently marked using flag reel fencing (or similar method) to facilitate identification of the development/conservation land interface during clearing. This will also facilitate access to BMP Lands for placement of in-stream snags. Temporary fencing restricting access must be installed prior to any further work commencing:

- The fence must be installed around the entire interface between the development site and BMP Lands;
- Install temporary signs on fence. Conservation areas are to be clearly marked as a "No Go Area" on the fencing itself. Signs should be placed at 50 metre intervals along the entire length of the fence;
- Gates should be installed to facilitate maintenance access for the bush regeneration contractor and installation of in-stream snags;
- The fence must be maintained for the duration of all construction works. Construction impacts must be restricted to the development site and must not encroach into areas of retained native vegetation and habitat;
- No clearing of vegetation, storage of vehicles or machinery, stockpiling, materials storage or unauthorised access is to occur within the fenced conservation area;
- Permanent fencing may be considered post BMP in discussion with Maitland City Council.

## 5.2 Site induction

Induction for all personnel entering/working onsite should highlight the sensitive nature of the conservation land and discuss the importance of avoiding all impact to this land including all the following activities:

- Clearing of vegetation;
- Storage of vehicles or machinery;
- Stockpiling, materials storage;
- Unauthorised access; and
- Dumping of rubbish or building waste.

## 5.3 Weed / Pathogens / Disease Control

Diseases which could affect the BMP Lands include the root-rot fungus (*Phytophthora cinnamomi*) and Myrtle rust (*Puccinia psidii*), affecting Myrtaceous plants including Eucalyptus species as well as Amphibian Chytrid fungus disease, Chytridiomycosis, caused by Chytrid fungus (*Batrachochytrium dendrobatidis*).

To minimise the potential for any such introductions, it is recommended that appropriate hygiene controls be employed and hygiene stations supplied:

**Plant, Machinery, Tools and Boots Hygiene**

- All plant/machinery is to be washed down upon entry to site and prior to exiting site;
- The location of wash down bays is to be clearly identified within the site;

- All tools utilised on site should be sterilised and washed free of soil before use and at the end of each day;
- Boots should be clean and free of soil and seeds before entry to site and before exiting site;
- Boots should be sterilised in a similar manner to tools after soil and seed removal; and
- Sterilisation of tools and boots shall be undertaken using 60% alcohol, methylated spirits or Phytoclean™ applied via spray bottle or brush dipped in the mixture.

**Phytophthora cinnamomi**

- Minimisation of work during excessively wet or muddy conditions;
- All personnel to be inducted on Phytophthora identification and management; and
- All plants and soils used/brought into site must be disease-free.

**Amphibian Chytrid fungus**

- Minimisation of work during excessively wet or muddy conditions;
- All personnel to be inducted on Chytrid management measures for the site;
- Handling of frogs only when necessary, using fresh disposable gloves to handle individual frogs.

**Myrtle Rust**

- All personnel to be inducted into the identification and management of Myrtle rust; and
- Should any areas on site be identified as areas contaminated by the above, additional exclusion measures including, work program directions, soil storage and waste disposal programs must be implemented.

## 5.4 Erosion and Sedimentation Control

An Erosion and Sedimentation Control Plan (ESCP) should be prepared for the proposed development and may form part of the Construction Environmental Management Plan (CEMP). Erosion and Sediment control measures should be implemented in accordance with specifications set out in the latest edition of the Landcom publication “Soils and Constructions – Volume 1” (The Blue Book).

Aquatic floating screening should be utilised around the extent of the works area to ensure that mobilised sediment and debris is not distributed into the wider system.

Bank stabilisation measures may be required in places to minimise long-term erosion risk including localised reshaping of the incised bank may leave bare areas exposed to the elements and prone to immediate erosion. As such, erosion control measures including installation of ground stabilising matting and revegetation using suitably dense planting of groundcovers, trees, shrubs and grasses should take place immediately upon completion of bank stabilisation.

The potential for erosion to arise from weed control activities is low due to the preferred method of control of *J. acutus* being herbicide spraying and for woody weeds is cut or scrape and paint with herbicide rather than manual removal. All weed control activities and methods employed should weigh the potential to generate erosion.

## 5.5 Rubbish Removal

Rubbish and waste are to be removed from BMP lands. The need to remove such material should be assessed on a case-by-case basis as in some instances the material is inert, such as concrete, rocks and timber posts, etc. Such material may inadvertently provide geomorphic stability and suitable shelter and habitat for native fauna.

## 5.6 Monitoring and Reporting

Upon completion of site preparation, a report outlining compliance with the above will be provided to Council. Monitoring is to occur in accordance with the CEMP.

# 6.0 Implementation of Regeneration

Project Ecologist and Bush Regeneration Contractor (BRC) to meet on site to establish location of monitoring points and establish management boundaries.

Baseline data collection at commencement of regeneration is vital to establishing the condition of the communities and setting the methodology to achieve the above targets. Given the Hunter Region has variable climatic conditions the vegetation conditions may vary from season to season and year to year. Hence determining the condition of the vegetation on commencement of a project is essential in determining the most appropriate methods to achieve the target above.

## 6.1 Baseline Data

Installation of monitoring and data collection points are to be undertaken by the Project Ecologist and BRC prior to site preparation. It is recommended that a minimum of four (4) monitoring points one in each MZ consisting of a 10m x 10m quadrat marked with two 1.8m star pickets located at the northeast and southwest corner. The location of the northeast corner should also be marked with a GPS waypoint to facilitate identification in the field and will be used as photo monitoring point.

Baseline data will cover:

- Species diversity (both native and exotic) within 10x10 quadrat;
- Species Projected Foliage Cover (both native and exotic expressed in percentages) within 10x10 quadrat;
- Overall health of the BMP Lands;
- Photo records at monitoring points at each aspect; and
- Record incidental fauna.

On completion of the baseline data collection the BRC will commence with works to meet the targets for Year 1:

- Primary weed removal;
- Jute matting and mulching;
- Installation of ground habitat (logs from timber felled as part of the proposal if applicable);
- Planting of Vegetation (see **Appendix B** for detailed species). All plant stock must be provenance specific seed / material collected from locally endemic species, grown by suitably experienced and qualified nurseries, and hardened-off before planting. This will ensure the structure and composition of these communities will meet the targets set;
- Preference should be given to native species known to be pioneering species able to compete with exotic regrowth; and
- Watering.

## 6.2 Weed Management

Weeds have significant impact on structural integrity of the vegetation present. Flora surveys identified the following weeds present.

### 6.2.1 Priority Weeds for Onsite Management

- ***Juncus acutus* (Sharp Rush);**
- *Axonopus affinis* (Narrow-leafed Carpet Grass);
- ***Senecio madagascariensis* (Fireweed);**

- ***Opuntia stricta* (Prickly Pear);**
- *Olea europaea* (Common Olive);
- *Ehrharta erecta* (Panic Veldtgrass);
- *Paspalum dilatatum* (Paspalum); and
- ***Cestrum parqui* (Green Cestrum).**

The aforementioned exotic species will be the focus of weed management activities, based on legal requirement to control the species listed as Priority Weeds for the Hunter Region (Hunter Regional Strategic Weed Management Plan 2023-2027) under the Biosecurity Act 2015 (**in bold**), as well as other species occurring in high density onsite that have the potential to further colonise the BMP Lands and undermine regeneration efforts. A list of all weed species identified onsite is provided in **Appendix A.**

The *Biosecurity Act 2015* outlines several 'duties'; the general biosecurity duty, and additional duties under mandatory measures, regional measures, prohibited matter or biosecurity zone. Specific action for these measures may be required. Weed control is required to occur in the following sequence:

### 6.2.2 Sequential Weed Control

Weed Control works within each Management Zone are to be undertaken by a qualified bushland regeneration team using industry standards.

Any reproductive material of weeds, including weeds which can spread vegetatively, or seeds, must be taken off site to be disposed of at an appropriate local waste management centre. No weed material with the potential of spreading must be stockpiled within the development site or BMP Lands.

1. **Primary Weeding** – First six-months. This is where most problematic weeds are removed from Management Zones.
2. **Consolidation (Secondary and tertiary weeding)** – Six-months following the completion of primary weeding. Management Zones will require monthly visits to remove weeds that are emergent annuals, regenerating and/or have grown in response to the disturbance. These visits are essential, otherwise the weeds will recolonise and inhibit native regeneration.
3. **Maintenance Weeding** – Starts six-months to a year post-secondary or tertiary weeding and will continue on a monthly basis for the following year. Maintenance will decrease overtime based on weed cover within Management Zones. Changes to frequency will be outlined in annual reports.

This interval will be evaluated based on site conditions during each monitoring period. Depending on the management zone, weed control works across the site are to be undertaken over the maintenance period of up to five (5) years. However, given the adaptive management approach, this time-frame is flexible, and may need to be extended based on changing site conditions and monitoring results indicating management zones have reached targets set out in this BMP.

### 6.2.3 Herbicides

Where herbicide usage is proposed, the following factors are to be taken into consideration when selecting the herbicide:

- The safety of the particular herbicide to users and use near waterways, desirable plants, soil micro-organisms, amphibians, birds and mammals; and
- The economics and time constraints of using herbicides over other methods of weed control.

Directions must be strictly followed and all precautions followed over time. For example, Glyphosate herbicides are systemic and non-selective. All staff spraying herbicide must possess an AQF3 Chemical Accreditation.

### 6.2.4 Reuse of Biomass

Some of the vegetation removed from the development site or brought in from another clearance site should be reused to benefit the BMP Lands.

- Salvaged logs should be used to install Re-snagging along the creek see **3.2.2 Re-snagging.**
- Salvaged logs should be placed at the interface between the future development and the BMP Lands to create a physical buffer that will provide some level of protection to the vegetation present;
- After construction works in the unnamed creek are completed such as, road crossing, rehabilitation batter, installation of snags heavy machinery should be restricted from entering the BMP Lands. In order to minimise further soil compaction and introduction weeds, no machinery should enter the BMP. Instead, logs should be carried by the clearing supervision ecologist into suitable locations, preferably using existing tracks.

## 6.3 Planting of Native Vegetation

The majority of vegetation within BMP lands is considered to be in poor condition without potential for regeneration. As such, reconstruction by mulching and planting will be necessary. A site-specific planting list has been provided in **Appendix B** based on the plant community present onsite.

The following measures are recommended to be implemented to enhance revegetation works:

- Preference should be given to native species known to be pioneering species able to compete with exotic regrowth e.g. acacias;
- Timing for revegetation work should avoid the summer months and should ideally be planned for spring and autumn;
- Soil preparation should include the addition of Terraform Plant Establisher or similar native fertilizer as well as the use of water crystals where necessary, at the discretion of the bush regeneration contractor;
- Protection guards should be placed around plantings so that revegetation efforts within BMP lands are not compromised by grazing from rabbits or kangaroos;
- If monitoring within management zones indicates pest species pose notable impediments to achieving the aims of the BMP (i.e., through excessive browsing, etc.), then management actions will be reviewed to address these issues;
- Mulching or jute matting will be necessary in most areas to help suppress weeds, stabilise soil and conserve soil moisture around the planting. This will help with minimizing the maintenance required for the planting to establish. Mulch should be sourced from a reputable source, from native trees only and be cured for a minimum period of 4 weeks prior to utilizing to avoid nitrogen draw down;
- Species selected for planting must occur in PCT 4023 - Coastal Valleys Riparian Forest.
- All plant stock must be provenance specific, seed / material collected from locally endemic species, grown by suitably experienced and qualified nurseries, and hardened-off before planting; and

- Watering may be necessary depending on the weather forecast during and in the weeks and month following planting events. As such the watering regime should be adapted to the conditions.

These measures will enable the structure and composition of these communities to meet the targets set.

## 6.4 Pest Species

Rabbits and hares have been observed onsite. Therefore, protection guards should be placed around plantings so that revegetation efforts within BMP lands are not compromised by grazing. If monitoring within management zones indicates pest species pose notable impediments to achieving the aims of the BMP (i.e., through excessive browsing, burrowing, spreading seed etc.), then management actions will be reviewed to address these issues.

It is strongly recommended to engage with Local Land Services (LLS) and adjacent landholders to identify the most suitable approach to control rabbits in the locality. The most effective approach combines a number of specific management actions including

- Baiting with Pindone;
- Warren destruction;
- Warren fumigation;
- Trapping; and
- Biological control.

Note that baiting with 1080 should not occur less than 500m from habitations as per LLS guidelines and as such should not be used onsite. Pindone is the only poison that can be used in urban area. Also note that Shooting is not recommended due to proximity to existing and proposed urban development.

No significant evidence of other feral animals was observed on site.

## 6.5 Fire as a Management Tool

Fire is essential for the regeneration of native sclerophyll ecosystems and should be considered for the long-term management of the remnant vegetation present onsite. Recommended fire intervals are based on vegetation formation and class. The following table provide details on the recommended fire interval for the PCT present onsite.

**Table 2 - Recommended Fire Intervals**

| PCT 4023 | |
|---|---|
| **Vegetation Formation** | Forested Wetland |
| **Vegetation Class** | Coastal Floodplain Wetlands |
| **Recommended Fire Interval by Hotspots Fire Project** | Scientists have not yet studied the role of fire in this vegetation type in any detail; however variable intervals between 7 and 35 years have been suggested. |

According to the NSW Rural Fire Service (2002) Minimum Fire Interval for Strategic Fire Management Zones (SFAZ) and Land Management Zones (LMZ) Forested Wetland: Coastal Floodplain Wetlands, the recommended minimum fire intervals are 7 years for SFAZs and 10 years for LMZs.

Given that the site currently contains very little vegetation and extensive planting is required, it is recommended that the site should not be burnt until the higher end of the interval, beyond the period of the BMP.

Impacts from fire or other serious impacting events is discussed in **Section 7.2 Interventions.**

# 7.0 Project Management

The client will be responsible for the engagement of a suitably qualified Bush Regeneration Contractor (BRC) to undertake weed control and planting works outlined in this BMP.

Bush Regenerator(s) or company(s) shall have;

- Australian Association of Bush Regenerators (AABR) Accreditation. The Bush Regenerators shall hold a current AQF3 qualification;
- Site Supervisor must have demonstrated minimum of 4 years' experience in the bush regeneration or related field and must have experience at a supervisory level in providing training, supervision and technical advice to staff, clients, volunteers and members of the public; and
- The Site Supervisor must hold a current AQF 3 qualification or higher and must have completed the Bush Regeneration Level IV Certificate or have a diploma or degree in a field related to natural resource management.

An official handover of the BMP to the BRC will be conducted by the Project Ecologist at the time of baseline monitoring and data collection (See **Section 7.1.1**). This will be undertaken via a site walkover and provide the opportunity to discuss BMP actions, targets, methodologies, requirements of sediment and erosion control, pest management, zone-specific management issues and placement of Photo Monitoring Points.

## 7.1 Monitoring and Reporting

The Project Ecologist will be responsible for the establishment of monitoring points within the BMP lands along with collection of baseline data that will be monitored over the five year period of this BMP with reporting on the achievement of overall targets and weed management, and regeneration approach success. Monitoring will occur at commencement on an annual basis for the duration of the BMP.

### 7.1.1 Baseline Data

Baseline monitoring and data collection to commence prior to site preparation and report submitted to Council.

### 7.1.2 Bush Regeneration Contractor Monthly Summary of Work

The BRC will provide a monthly summary of works undertaken which will be reviewed by the Project Ecologist and added to the annual report. If any issues arise these will be outlined in the monthly summaries and the BRC and Project Ecologist will determine action required to meet the set targets. If such determination requires significant change to the management outline in the BMP, the Project Ecologist will contact Maitland City Council to inform them of the changes.

### 7.1.3 Annual Monitoring by Project Ecologist

This is to occur once a year, (spring or autumn preferably) for the duration of the BMP. Monitoring should include the same metrics as the baseline data but should also include information such as:

- Effectiveness of weed control methods;
- State of fencing and erosion and sedimentation measures.

Annual monitoring will inform the evaluation of management effectiveness, until the Regeneration Benchmark Targets are met.

### 7.1.4 Reporting

Progress reports are to be submitted to Maitland City Council's Ecologist annually for a minimum of five years following issue of the construction certificate. Reports are to detail the progress of the works and any recommended additional actions, with a final report certifying completion of the BMP at the end of the implementation period, or once the specific objectives of the plan have been met. Any recommended additional actions must be completed to the satisfaction of Maitland City Council's Ecologist prior to lodgement of the final report.

Once in a state of Natural Regeneration following completion of the BMP period, management of the site will be undertaken in accordance with the *Biosecurity Act 2015* & *Biosecurity Regulations 2017.*

## 7.2 Interventions

With all regeneration plans, objectives and targets are set based on good conditions, however, this may not always be the case. The following table has been prepared as an action plan to accommodate setbacks and ensure targets can be achieved.

**Table 3 – Intervention Steps**

| Element Change | Step 1 | Step 2 | Step 3 | Step 4 | Step 5 |
|---|---|---|---|---|---|
| **Fire** | BRC to notify Project Ecologist and arrange a joint site inspection. | Assess impact to BMP Lands. | Prepare regeneration plan | Submission of notification and modified Plan to Council. | Implement approved Plan |
| **Flood** | | | | | |
| **Drought** | | | | | |
| **Other weather event** | | | | | |
| **Pest Species damage** | | | | | |
| **Introduction of pathogen** | | | | | |
| **Vandalism** | | | | | |
| **Theft** | | | | | |

### 7.2.1 Fire

Fire and other impacts above have the potential to drastically alter monitoring results compared to previous reporting. In the event of fire or other serious event impacting VMP Lands, the Project Ecologist would develop a report reviewing impacts of the event and suggesting changes required to the BMP to be approved by Council Ecology.

**Table 4 – Proposed Works Schedule**

| Activity | Specific Action | Year 1 | | | | Year 2 | | | | Year 3 | | | | Year 4 | | | | Year 5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| BMP Lands Preparation | Installation / removal of fencing and signage | Installed at the beginning of Year 1 and removed once construction is finished | | | | | | | | | | | | | | | | | | | |
| | Implementation of pathogen and disease controls | To be implemented throughout the duration of the BMP | | | | | | | | | | | | | | | | | | | |
| | Installation of sediment and erosion control | Installed at the beginning of Year 1 and monitored throughout the duration of the BMP | | | | | | | | | | | | | | | | | | | |
| | Bank stabilisation measures | | | | | | | | | | | | | | | | | | | | |
| | Rubbish removal | | | | | | | | | | | | | | | | | | | | |
| | Installation of in-stream snags | | | | | | | | | | | | | | | | | | | | |
| | Relocation of logs to BMP Lands | | | | | | | | | | | | | | | | | | | | |
| | Installation of erosion control | | | | | | | | | | | | | | | | | | | | |
| | Mulching | | | | | | | | | | | | | | | | | | | | |
| Planting | Primary planting | | | | | | | | | | | | | | | | | | | | |
| | Watering | | | | | | | | | | | | | | | | | | | | |

| Activity | Specific Action | Year 1 | | | | Year 2 | | | | Year 3 | | | | Year 4 | | | | Year 5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Planting | Installation of plant guards | | | | | | | | | | | | | | | | | | | | |
| | Maintenance of tree guards | | | | | | | | | | | | | | | | | | | | |
| | Infill planting if required | | | | | | | | | | | | | | | | | | | | |
| | Maintenance watering | | | | | | | | | | | | | | | | | | | | |
| Weed Control | Primary weeding all MZs (Monthly) | | | | | | | | | | | | | | | | | | | | |
| | Consolidation (Secondary and Tertiary) weeding (Monthly) | | | | | | | | | | | | | | | | | | | | |
| | Maintenance Weeding - Frequency to be adjusting according to monitoring findings | | | | | | | | | | | | | | | | | | | | |
| Project Management | Set up Monitoring Plots and collect baseline data | | | | | | | | | | | | | | | | | | | | |
| | Annual monitoring | | | | | | | | | | | | | | | | | | | | |

| Activity | Specific Action | Year 1 | | | | Year 2 | | | | Year 3 | | | | Year 4 | | | | Year 5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Project Management | Reporting (to be submitted to Maitland City Council within 2 weeks of annual monitoring | | | | | | | | | | | | | | | | | | | | |
| | Certification report (One-off on completion of the project) | | | | | | | | | | | | | | | | | | | | |

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# Appendix A – Weed Species Found within the BMP Lands

**Weed Species present within the BMP Lands**

| Family | Scientific Name | Common Name | Priority Weeds for the Hunter (BC Act 2015)<br>Hunter Regional Strategic Weed Management Plan 2023-2027 (LLS 2022) |
|---|---|---|---|
| Alliaceae | *Nothoscordum borbonicum* | Onion Weed | General Biosecurity Duty |
| Amaranthaceae | *Amaranthus spp.* | Amaranth | General Biosecurity Duty |
| Apiaceae | *Daucus carota* | Wild Carrot | General Biosecurity Duty |
| Asteraceae | *Aster subulatus* | Wild Aster | General Biosecurity Duty |
| Asteraceae | *Cirsium vulgare* | Spear Thistle | General Biosecurity Duty |
| Asteraceae | *Conyza bonariensis* | Flaxleaf Fleabane | General Biosecurity Duty |
| Asteraceae | *Gamochaeta purpurea* | Purple Cudweed | General Biosecurity Duty |
| Asteraceae | *Hypochaeris radicata* | Cat's ear | General Biosecurity Duty |
| Asteraceae | *Onopordum acanthium subsp. acanthium* | Scotch Thistle | General Biosecurity Duty |
| Asteraceae | ***Senecio madagascariensis*** | **Fireweed** | High Threat Weed - not manageable |
| Asteraceae | *Soliva sessilis* | Bindyi | General Biosecurity Duty |
| Brassicaceae | *Cardamine flexuosa* | Wood Bittercress | General Biosecurity Duty |
| Brassicaceae | *Cardamine hirsuta* | Common Bittercress | General Biosecurity Duty |
| Caryophyllaceae | *Stellaria media* | Common Chickweed | General Biosecurity Duty |
| Fabaceae (Faboideae) | *Medicago polymorpha* | Burr Medic | General Biosecurity Duty |
| Fabaceae (Faboideae) | *Trifolium repens* | White Clover | General Biosecurity Duty |
| Juncaceae | *Juncus acutus subsp. acutus* | Sharp Rush | Regional Recommended Measure* (for Regional Priority - Asset Protection)<br>Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value. |
| Juncaceae | *Juncus cognatus* | 0 | General Biosecurity Duty |
| Malvaceae | *Sida rhombifolia* | Paddy's Lucerne | General Biosecurity Duty |
| Oleaceae | *Olea europaea* | Common Olive | High Threat Weed - manageable |

| Family | Scientific Name | Common Name | Priority Weeds for the Hunter (BC Act 2015)<br><br>Hunter Regional Strategic Weed Management Plan 2023-2027 (LLS 2022) |
|---|---|---|---|
| Cactaceae | ***Opuntia stricta*** | **Prickly Pear** | Regional Recommended Measure* (for Regional Priority - Asset Protection)<br>Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value. |
| Plantaginaceae | *Plantago lanceolata* | Lamb's Tongues | General Biosecurity Duty |
| Poaceae | *Axonopus fissifolius* | Narrow-leafed Carpet Grass | High Threat Weed |
| Poaceae | *Ehrharta erecta* | Panic Veldtgrass | High Threat Weed |
| Poaceae | *Paspalum dilatatum* | Paspalum | High Threat Weed |
| Poaceae | *Poa annua* | Winter Grass | General Biosecurity Duty |
| Poaceae | *Setaria parviflora* | Slender Pigeon Grass | General Biosecurity Duty |
| Poaceae | *Setaria pumila* | Pale Pigeon Grass | General Biosecurity Duty |
| Poaceae | *Sporobolus africanus* | Parramatta Grass | General Biosecurity Duty |
| Polygonaceae | *Rumex crispus* | Curled Dock | General Biosecurity Duty |
| Primulaceae | *Lysimachia arvensis* | Scarlet Pimpernel | General Biosecurity Duty |
| Ranunculaceae | *Ranunculus sceleratus* | Celery Buttercup | General Biosecurity Duty |
| Solanaceae | *Cestrum parqui* | Green Cestrum | Regional Recommended Measure* (for Regional Priority - Asset Protection)<br>Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of the plant on assets of high economic, environmental and/or social value. |
| Solanaceae | *Solanum nigrum* | Blackberry Nightshade | General Biosecurity Duty |
| Verbenaceae | *Verbena bonariensis* | Purpletop | General Biosecurity Duty |

| Family | Scientific Name | Common Name | Priority Weeds for the Hunter (BC Act 2015)<br><br>Hunter Regional Strategic Weed Management Plan 2023-2027 (LLS 2022) |
|---|---|---|---|
| Verbenaceae | *Verbena quadrangularis* | 0 | General Biosecurity Duty |

Species indicated in bold are also listed as Weeds of National Significance (WoNS) under the Federal Government's National Weed Strategy.

# Appendix B – Revegetation Species List

**Revegetation Species List - Approximate densities and species for revegetation of the BMP lands**

| Tree | Density | Shrubs | Density | Groundcovers | Density |
|---|---|---|---|---|---|
| **MZ1, Aquatic** | | | | | |
| *N/A* | N/A | *N/A* | N/A | *Juncus usitatus*<br>*Juncus kraussii*<br>*Carex appressa*<br>*Carex longebrachiata*<br>*Gahnia clarkei*<br>*Baumea juncea*<br>*Machaerina juncea*<br>*Cycnogeton spp.* | 4/m$^2$ |
| **MZ2 & MZ3: PCT 4023 - PCT 4023 - Coastal Valleys Riparian Forest** | | | | | |
| *Eucalyptus moluccana*<br>*Eucalyptus amplifolia*<br>*Acacia parramattensis*<br>*Eucalyptus tereticornis*<br>*Acacia decurrens*<br>*Angophora floribunda*<br>*Casuarina cunninghamiana* | 1/20 m$^2$ | *Bursaria spinosa*<br>*Breynia oblongifolia*<br>*Melaleuca styphelioides*<br>*Melaleuca decora*<br>*Rubus parvifolius*<br>*Acacia implexa*<br>*Hibbertia diffusa*<br>*Melaleuca linariifolia*<br>*Melaleuca thymifolia*<br>*Ozothamnus diosmifolius*<br>*Pittosporum revolutum*<br>*Trema tomentosa var. aspera* | 1/10m$^2$ | *Microlaena stipoides*<br>*Oplismenus aemulus*<br>*Echinopogon ovatus*<br>*Entolasia marginata*<br>*Juncus usitatus*<br>*Paspalidium distans*<br>*Lomandra longifolia*<br>*Themeda triandra*<br>*Entolasia stricta*<br>*Cymbopogon refractus*<br>*Lomandra multiflora subsp. multiflora*<br>*Carex appressa*<br>*Carex breviculmis*<br>*Dichondra repens*<br>*Lobelia purpurascens*<br>*Centella asiatica*<br>*Commelina cyanea*<br>*Dianella longifolia*<br>*Hydrocotyle sibthorpioides*<br>*Cheilanthes sieberi subsp. sieberi*<br>*Cheilanthes distans*<br>*Adiantum aethiopicum*<br>*Blechnum spinulosum*<br>*Hypolepis muelleri* | 4/m$^2$ |

# Appendix C – BMP Lands Signage

# NO UNAUTHORISED ENTRY

# This is a Vegetation Rehabilitation Area

- **NO DUMPING or WASTE DISPOSAL**
- **NO ANIMALS, VEHICLES or MACHINERY**

**For information – contact Site Manager**

AEP VMP SIGNAGE permanent sign, minimum size 600mm x 400mm erected and maintained at key access points to VMP lands for the life of the project

# Appendix D – CVs

**The fieldwork, data analysis and reporting for the BMP was undertaken by:**

| Staff | Title/Qualification | Tasks |
|---|---|---|
| Natalie Black | Senior Environmental Manager<br>BSc (Hons), Master Planning, Cert IV (TA)<br>BAAS: 19076 | Technical Review |
| Yann Buissiere | Senior Ecologist<br>BEnv & ResMgt, Dip Cons Land Mgt | Report review |
| Byron de Jager | Ecologist<br>B. Science, Sustainable Resource Mgt,<br>Cert III Cons Land Mgt<br>AABR accredited member | Report Author and Field work |
| Brendon Young | Ecologist<br>Master of Environmental Management (Water Resources)<br>Grad Cert Fish Cons & Mgt<br>B. Applied Sc (Fisheries) with Honours | Fieldwork |
| Oliver Saunders | Ecologist<br>BSc Science Env Mgmt | Field work |
| Kathleen Bushell | B. Science (Hons), Marine Bio & Env Science & Mgt. | Fieldwork and mapping |