

**BOX HILL NORTH - THE GABLES**

**Vegetation Management Plan for Matters of National  
Environmental Significance**

For:

**Celestino Developments Pty Limited**

July 2017

**Final**



**PO Box 2474  
Carlingford Court 2118**

**Report No. 15062RP4**

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The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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Approved by: David Robertson

Position: **Director**

Signed:

A handwritten signature in cursive script that reads "David Robertson".

Date: 27 July, 2017

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Project EPBC Number	2014/7119
Project Name	The Gables, Box Hill North
Proponent/approval holder	E.J.Cooper & Son Pty Ltd
	ACN 000 269 750
Proposed/approved action	Development of a 339 ha parcel of land to accommodate residential dwellings, community centres, a town centre, school, roads and associated infrastructure
Location of action	Box Hill North, New South Wales

**Declaration of accuracy**

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed

Full name (please print)

Organisation (please print)

Date

  
GEORGE TSEKOURAS

CELESTINO DEVELOPMENTS PTY LIMITED

31 / 07 / 17

# Table of Contents

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## EXECUTIVE SUMMARY

### 1 INTRODUCTION

1.1	Background	1.1
1.2	Project Description	1.2
1.2.1	Site Description	1.2
1.2.2	Vegetation Management and Offsets	1.3
1.2.3	Related Council Conditions	1.3
1.3	Objectives	1.4

### 2 METHODS

2.1	Literature Review	2.1
2.2	Flora Survey Effort	2.2

### 3 VEGETATION MANAGEMENT ZONES

3.1	Masterplan Management Zones	3.1
3.1.1	Masterplan Management Zone Objectives	3.2
3.2	Management Areas within the Subject Site	3.4
3.3	Precinct Specific Management Zones	3.5

### 4 VEGETATION CLEARING PROTOCOLS

4.1	Introduction	4.1
4.2	Hygiene Protocols	4.1
4.3	Marking Limits of Vegetation Clearing	4.1
4.4	Fencing of Native Vegetation to be Retained	4.2
4.5	Pre-clearing Surveys	4.2
4.5.1	Flora Pre-clearing Surveys	4.2
4.5.2	Fauna Pre-clearance Surveys	4.3
4.6	Salvage of Hollow-Bearing Trees, Hollow-bearing Logs, other Woody Material, and Bushrock	4.4
4.7	Seed Collection / Harvest	4.4

---

## Table of Contents *(Cont'd)*

### **5 WEED MANAGEMENT PLAN**

5.1	Introduction	5.1
5.1.1	Species Lists	5.1
5.1.2	Best Management Practice	5.1
5.1.3	Weed Control Methods	5.2
5.1.4	Types of Weed Control	5.3
5.2	Weed Management in the Subject Site	5.4
5.2.1	Site Preparation for Bushland Reconstruction Areas	5.4
5.2.2	Initial Weed Treatment of Regeneration Areas	5.5
5.2.3	Ongoing Weed Maintenance in Reconstruction and Regeneration Areas	5.6
5.3	Pest Species Management	5.7

### **6 RECONSTRUCTION AND REGENERATION PLAN**

6.1	Aims	6.1
6.2	Recommended Revegetation techniques	6.1
6.2.1	Species Selection and Planting Densities	6.1
6.2.2	Characteristic Planting Units	6.2
6.2.3	Plant Supply	6.2
6.2.4	Re-vegetation Objectives to Maximise Fauna Utilisation	6.3
6.3	Regeneration Site Preparation	6.3
6.4	Maintenance of Regeneration Zones	6.4
6.5	Reconstruction Site Preparation	6.4
6.6	Maintenance of Reconstruction Zones	6.5
6.7	Ongoing Management during Operation of the Study Area	6.6
6.7.1	Weed Control	6.6
6.7.2	Monitoring of Regenerating Vegetation	6.6
6.7.3	Management of Ground Fuel Loads	6.6
6.8	Schedule of Works	6.6
6.9	Signage	6.7

## Table of Contents *(Cont'd)*

---

### **7 MONITORING, RISK ASSESSMENT AND REPORTING**

7.1	Monitoring Program	7.8
7.2	Risk Assessment	7.9
7.3	Reporting	7.15
7.4	Adaptive Implementation Strategy	7.15

### **8 TIMING AND RESPONSIBILITIES**

### **REFERENCES**

---

## List of Appendices

- 
- A. MASTERPLAN VMP (COUNCIL) MANAGEMENT ZONES**
  - B. SPECIES PLANTING LIST**
  - C. WEED CONTROL METHODS**
- 

## List of Tables

---

1.1	Consistency of VMP with EPBC 2014/7119 Condition 6	1.4
3.1	Distribution of Management Zones across the subject site	3.2
3.2	Areas of Managed Vegetation within the Subject Site	3.4
5.1	State Listed Priority weeds and WONS recorded in the subject land	5.1
7.1	Risk Assessment and Management	7.10
8.1	Timing and Responsibilities within Management Zones	8.2
B.1	Species Planting List – Cumberland Plain Woodland	B.1
B.2	Species Planting List – Shale Sandstone Transition Forest	B.8
C.1	Weed Control Methods	C.1

## List of Figures

---

1.1	Aerial View of the Subject Land	1.6
1.2	Existing MNES Vegetation within the Subject Site	1.7
3.1	MNES Management Zones	3.6

## Glossary of Terms

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APZ	Asset Protection Zone
BRC	Bushland Regeneration Contractor
CEEC	Critically Endangered Ecological Community
CPW	Cumberland Plain Woodland
DA	Development Application
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
LGA	Local Government Area
Masterplan VMP	Vegetation Management Master Plan (REF 15029RP1)
OEH	NSW Office of Environment and Heritage
PPE	Personal Protective Equipment
SIS	Species Impact Statement
SSTF	Shale-sandstone Transition Forest
Subject land	The area of land that forms part of the Gables Development area.
Subject site	Precincts E, F, G and I of the Gables Development
TSC Act	NSW <i>Threatened Species Conservation Act 1995</i>
VMP	Vegetation Management Plan
WONS	Weeds of National Significance



## Executive Summary

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The Gables is a 339 ha parcel of land ('the subject land') at Box Hill North, NSW that is to be developed to accommodate residential dwellings, community centres, a town centre, schools, roads and associated infrastructure. The subject land is divided into nine separate development 'Precincts', namely Precincts A – I.

The Gables development was referred to the Commonwealth Department of Environment and Energy (DoEE) and was determined to be a Controlled Action under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) due to its likely impacts upon Matters of National Environmental Significance (MNES)

The purpose of this Vegetation Management Plan (VMP) is to prescribe measures for the conservation and management of MNES as required under Condition 6 of the EPBC Act approval 2014/7119 (EPBC 2014/7119), dated 19 July 2016. This VMP encompasses all MNES vegetation and MNES habitat to be retained and replanted outside of the Biobank sites (which are managed under the requirements of Condition 5 of EPBC 2014/7119).

The management actions that will be undertaken under this VMP include:

- Identification of management zones;
- Vegetation clearing protocols;
- Weed management strategies;
- Reconstruction and Regeneration works; and
- Monitoring strategies and reporting.

Key risks to manage are potential weed invasion, inadvertent damage to vegetation during clearing works and related dam dewatering, harm to fauna during clearing works, harm to replanted areas and infection by *Phytophthora cinnamomi*. This VMP provides a risk analysis and contingency actions to be implemented in the case of these risks occurring.

An annual performance report will be prepared following the 12 month anniversary of the commencement of management works within the respective precincts. The report will be submitted to DoEE. The annual performance report will contain details of the implementation of the VMP, including the results of the key management actions and any adaptive measures.

# Introduction

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## 1.1 Background

The Gables is a 339 ha parcel of land ('the subject land') at Box Hill North, NSW that is to be developed to accommodate residential dwellings, community centres, a town centre, schools, roads and associated infrastructure. The subject land is divided into nine separate development 'Precincts', namely Precincts A – I (**Figure 1.1**).

The Gables development was referred to the Commonwealth Department of Environment and Energy (DoEE) and was determined to be a Controlled Action under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) due to its likely impacts upon Matters of National Environmental Significance (MNES), namely endangered ecological communities and threatened species. The affected MNES include:

- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CPW);
- Shale Sandstone Transition Forest of the Sydney Basin Bioregion (SSTF); and
- Grey-headed Flying Fox (GHFF).

The MNES and MNES habitats are restricted to Precincts E, F, G and I (hereafter collectively referred to as 'the subject site') and the EPBC Act conditions of approval are limited to these four precincts. CPW is present within the area known as Precinct I while SSTF predominantly occurs within Precinct G with smaller occurrences within Precincts E and F (**Figure 1.2**). The CPW and SSTF vegetation also constitute potential foraging habitat for the GHFF.

Areas within Precincts I and G respectively are to be conserved as two separate BioBank sites under the NSW BioBanking scheme (**Figure 1.2**). As per the requirements of Condition 5 of the EPBC Act approval 2014/7119 (EPBC 2014/7119), dated 19 July 2016, MNES and their habitat within the BioBank sites will be managed in accordance with the approved Interim Management Plan until the formal BioBanking agreements are approved by the NSW Office of Environment and Heritage (OEH) and DoEE.

The BioBanking Applications for the two BioBank sites (the Boundary Road BioBank site in Precinct I and the Maguires Road BioBank site in Precinct G) were submitted to the NSW Office of Environment and Heritage (OEH) on 30 May 2017 and are currently awaiting OEH review. As per the requirements of Condition 4 of the EPBC 2014/7119, the BioBanking

Agreement, as drafted by OEH following review of the application documentation, and supporting documentation will be submitted to DoEE for approval prior to the signing of the Agreement.

The development of the subject site includes retention of CPW and SSTF as well as revegetation of CPW and SSTF outside the boundaries of the BioBank sites. Condition 6 of the EPBC 2014/7119 requires these areas of MNES to be managed under a Vegetation Management Plan.

The purpose of this document is to present a Vegetation Management Plan (VMP) in accordance with the conditions of approval that prescribes management of MNES vegetation and MNES habitat within the subject site, excluding the BioBank sites. The BioBank sites will be managed under the approved Interim Management Plan and subsequent BioBanking Agreement and are not addressed further within this document.

## 1.2 Project Description

### 1.2.1 Site Description

The subject land is 339ha in size, located along Boundary Road, at Box Hill North. It is bounded by Maguires Road to the north, Janpieter Road to the east, Old Pitt Town Road to the south and Boundary Road to the west. The land has recently been rezoned to permit residential and other related development.

The subject land has historically been used for cattle grazing, cropping and hobby farming purposes. As a result of these past and current land uses, the majority of the subject land has been historically cleared of native vegetation and is dominated by exotic grasses. Treed vegetation is mainly represented by a mosaic of regenerating patches of open forest and woodland at various stages of canopy regeneration. These comprise patches of CPW and SSTF. The patches of CPW and SSTF within the subject site occur mainly within Precincts I and G with minor occurrences in Precincts E and F.

Precincts A, B, C, D and H are not subject to EPBC 2014/7119 conditions of approval and works commenced within these five precincts in July 2016 in accordance with conditions of approval from the Hills Shire Council. Works conducted to date mainly include demolition of existing buildings and bulk earthworks with associated vegetation removal and dam decommissioning.

Vegetation removed from precincts A and H consisted of scattered remnant native trees. Whilst these remnants contained canopy species indicative of CPW (*Eucalyptus crebra* (Narrow-leaved Ironbark), *E. moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum)) they lacked understorey and ground cover vegetation and did not comprise CPW. The vegetation in the remainder of the precincts (B, C and D) comprises exotic vegetation and planted trees, mainly exotic palms.

### **1.2.2 Vegetation Management and Offsets**

As outlined in Section A5 of the preliminary documentation summary letter prepared by Cumberland Ecology (15062-Let10, dated 23 March 2016), the vegetation within the subject land has been allocated to four categories based on the final development layout. This includes:

- Vegetation to be cleared;
- Vegetation to be retained;
- Vegetation to be conserved; and
- Vegetation to be planted.

In accordance with Conditions 1 and 2 of EPBC 2014/7119, the clearing of 8.78 ha of CPW and 5.81 ha of SSTF will be fully offset through retirement of BioBanking Ecosystem credits.

Vegetation to be retained comprises vegetation within asset protection zones (APZs) and recreational lands (RE1 zones), as indicated in Figure 9 of the preliminary documentation summary letter. Although this vegetation will not be completely removed, it has been included within the impact assessment and BioBanking calculations (i.e. credit calculations have been conducted for a total impact area of 10.27 ha of CPW and 12.95 ha of SSTF) and impacts to this vegetation will be fully offset via retirement of BioBanking Ecosystem credits. Nevertheless, as the MNES vegetation will not be completely removed, the retained vegetation is subject to this VMP.

Vegetation to be conserved encompasses vegetation located within the two Biobank sites. In accordance with Condition 5 of EPBC 2014/7119, this vegetation will be managed under the approved Interim Management Plan until approval of the formal BioBanking Agreements and is not addressed further in this document.

Vegetation to be planted comprises a supplementary measure to ameliorate the loss of biodiversity through clearing of non-MNES vegetation across the subject land, primarily the scattered trees cleared from Precincts A and H. Although this vegetation does not form part of the offsets for impacts to MNES, the vegetation outside the riparian corridors is proposed to be revegetated to a form that conforms to the definition of MNES vegetation and is therefore subject to this VMP.

### **1.2.3 Related Council Conditions**

The conditions of consent issued by Hills Shire Council (Council) required the preparation of an overarching Masterplan VMP for the entire subject land as well as precinct specific VMPs based on landscaping and design plans for the respective precincts.

A Masterplan VMP for the entire subject land was prepared by Cumberland Ecology in December 2015 and is currently enforced across the entire subject land (the Masterplan VMP). To date precinct specific VMPs have been prepared for development applications (DAs) for Precincts A, C, E and H. This VMP for MNES within the subject site (Precincts E,

F, G and I) has therefore been prepared with due consideration to the Masterplan VMP and precinct specific VMPs prepared to date.

### 1.3 Objectives

The objective of this VMP is to guide the restoration of the subject site in relation to MNES. To accomplish this objective, the following measures are addressed within this VMP:

- Identification of management zones;
- Vegetation clearing protocols;
- Weed management strategies;
- Reconstruction and Regeneration Plan;
- Monitoring strategies and reporting requirements; and
- Performance and completion criteria.

**Table 1.1** below identifies where each required component of Condition 6 of EPBC 2014/7119 is addressed in this VMP.

**Table 1.1 Consistency of VMP with EPBC 2014/7119 Condition 6**

Consent Condition 6 requirement	Where addressed in this VMP
a) details of the management actions to be undertaken;	Section 1.3, Chapters 4 - 6
b) clear objectives and performance indicators for all management actions;	Chapter 3, Table 7.1, Table 8.1
c) measures to revegetate cleared areas with CPW and SSTF at the impact site;	Chapter 6
d) measures for pre-clearance surveys (particularly for Grey-headed Flying-fox species);	Section 4.5 (particularly Section 4.5.2)
e) measures to manage weeds;	Chapter 5
f) measures to prevent the occurrence of dieback by <i>Phytophthora cinnamomi</i> during construction;	Section 4.2
g) details of the monitoring and reporting to be undertaken to demonstrate the effectiveness of the measures referred to in (a – f), including the parameters to be monitored, methods, timing, frequency and location of monitoring;	Chapter 7, Chapter 8
h) conditions specified in this approval for which the plan is being provided;	Table 1.1
i) the relevant chapter, section number and page number in the	Table 1.1

**Table 1.1      Consistency of VMP with EPBC 2014/7119 Condition 6**

<b>Consent Condition 6 requirement</b>	<b>Where addressed in this VMP</b>
plan where the condition has been addressed.	





**Legend**

- Subject Site
- Subject Land
- Development Precincts
- Properties excluded from the assessment

Image Source:  
Image © 2015 Aerometrex  
(dated 01-01-2014)

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**Figure 1.1. Aerial view of the Subject Land**

100 0 100 200 300 400 m





#### Legend

- Subject Site
- Subject Land
- Development Precincts
- Proposed Biobank Site
- Properties excluded from the assessment

#### Vegetation Community

- Cumberland Plain Woodland
- Shale Sandstone Transition Forest

Image Source:  
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(dated 01-01-2014)

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Figure 1.2. Existing MNES Vegetation within the Subject Site

100 0 100 200 300 400 m



## Methods

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### 2.1 Literature Review

The preparation of the VMP involved a literature review to determine the most up to date methods of weed control for exotic species that are present in the subject site. This literature review involved a variety of sources including government fact sheets and websites. Cumberland Ecology staff with expertise in bushland maintenance were also consulted on current best practice methods and techniques for weed control and bush regeneration.

In order to prepare species planting lists for revegetation the following documents were reviewed in conjunction with a review of field survey data:

- Shale Sandstone Transition Forest – Final Determination (NSW Scientific Committee, 2015);
- Approved Conservation Advice (including listing advice) for Shale Sandstone Transition Forest of the Sydney Basin Bioregion (EC25R) (TSSC, 2014);
- Cumberland Plain Woodland in the Sydney Basin Bioregion – Final Determination (NSW Scientific Committee, 2009);
- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest Policy Statement 3.31 (DEWHA, 2010);
- Vegetation Management Master Plan (the ‘Master Plan’) (REF 15029RP1) (Cumberland Ecology, 2015c);
- Restoring Bushland on the Cumberland Plain (DEC (NSW), 2005); and
- Cumberland Plain Recovery Plan (DECCW, 2011).

The species list prepared for revegetation areas within the subject site not only includes species listed as diagnostic for the vegetation communities, but also includes additional species that were recorded as naturally occurring local endemics within these communities in adjacent areas. It should be noted that these additional species are not specifically listed under the final determination for the community. Species listed under final determinations are a broad view of characteristic species for a particular community, and do not take into account natural variation at the site level which the proposed species list attempts to do.

## 2.2 Flora Survey Effort

Cumberland Ecology has surveyed the Gables Development (the subject land as shown in **Figure 1.1**) extensively during preparation of a Fauna and Flora Assessment (Cumberland Ecology, 2013), a Species Impact Statement (SIS) (Cumberland Ecology, 2015a) and Addendum SIS (Cumberland Ecology, 2015b) of which the subject site is a component. This study area has also undergone surveys by NGH Environmental in 2012 (NGH Environmental, 2013).

Species lists for weed and native species present in the subject site and as used in this VMP, have been compiled from quadrat data, random meander surveys, photo-points, and rapid assessment points undertaken during these surveys.

## Vegetation Management Zones

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### 3.1 Masterplan Management Zones

Under the Masterplan VMP prepared to meet Council conditions, the wider subject land is divided into seven broad management zones based on the community of remnant vegetation and the specific management objectives required for each area. These zones are:

- Zone 1: Existing CPW;
- Zone 2: CPW - Revegetation on Existing Landform;
- Zone 3: CPW - Reconstruction Following Major Earthworks;
- Zone 4: CPW - Revegetation under Power line Easement;
- Zone 5: Existing SSTF;
- Zone 6: SSTF – Revegetation on Existing Landform; and
- Zone 7: SSTF – Reconstruction Following Major Earthworks.

An extract from the final Masterplan VMP report showing the management zones is provided in **Appendix A**. It should be noted that ongoing negotiations with Council and OEH and resultant conditions of consent following Council approval of the Masterplan VMP have resulted in amendments to the layout/zonation of areas as shown in the figure provided in **Appendix A** as well as the addition of BioBank sites. These amendments are indicated in the precinct specific VMPs. The management objectives of the various zones remain unchanged.

With the exception of Zones 2 and 4, all management zones affect MNES and MNES habitat that is to be managed under this VMP. In order to maintain consistency with the Masterplan VMP, the same management zone name/numbers are utilised in this VMP.

The distribution of these zones across the subject site is summarised in **Table 3.1** below.

**Table 3.1 Distribution of Management Zones across the subject site**

Masterplan Management Zone	Precinct E	Precinct F	Precinct G	Precinct I
Zone 1				+
Zone 3				+
Zone 5			+	
Zone 6			+	
Zone 7		+		

### **3.1.1 Masterplan Management Zone Objectives**

#### *i. Zone 1 - Existing Cumberland Plain Woodland*

Zone 1 consists of degraded patches of CPW within Precinct I containing remnant/regrowth canopy species, and remnant native understorey and ground layer species. The patches of woodland have relatively high densities of exotic species in the ground layer.

The objectives of this management zone are:

- Retain and protect existing CPW remnants in the zone;
- Control exotic weed species; and
- Supplement natural regeneration with native vegetation planting as required.

#### *ii. Zone 3 – Cumberland Plain Woodland – Reconstruction after Major Earthworks*

Zone 3 consists of exotic grassland areas within Precinct I. These areas will be completely cleared of vegetation during construction, with the landform to be changed following major earthworks. These areas occur predominately along riparian corridors and are to be revegetated (reconstructed) as CPW.

The objectives of this management zone are:

- Control and removal of exotic species; and
- Restore cleared areas to form contiguous high-quality riparian corridor of CPW;

#### *iii. Zone 5 – Existing Shale Sandstone Transition Forest*

Zone 5 consists of a patch of SSTF within Precinct G. The patch of SSTF contains the majority of the largest, remnant trees on the subject site, the highest fauna habitat values, and contains a greater diversity of native flora species in all strata than other vegetation patches on the site. The ground layer however suffers in areas from significant coverage of exotic weed species and occurrences of exotic shrub species are present throughout the patch.

The objectives of this management zone are:

- Retain and protect existing SSTF remnants in the zone;
- Control exotic weed species;
- Plant canopy species where significant gaps exist in the canopy; and
- Supplement natural regeneration with native vegetation planting as required.

iv. *Zone 6 – Shale Sandstone Transition Forest Revegetation on Existing Landform*

Zone 6 comprises areas within Precinct G consisting of exotic dominated grassland, occurring adjacent patches of remnant SSTF. While these areas are dominated by exotic grasses, they are not degraded to the extent that the grasslands further south are, and still contain native elements, mostly scattered grasses and herbs. These areas will not undergo major earthworks and restoration of SSTF will be undertaken on the currently existing landform.

The objectives of this management zone are:

- Control weeds;
- Retain native, remnant elements of ground layer and understorey where possible; and
- Revegetate areas with a diverse array of native canopy, understorey, and ground layer species.

v. *Zone 7 - Shale Sandstone Transition Forest – Reconstruction after Major Earthworks*

Zone 7 consists of exotic grassland areas within Precinct F. These areas will be completely cleared of vegetation during construction, with the landform to be changed following major earthworks. These areas occur predominately along riparian corridors and are to be revegetated (reconstructed) as SSTF.

The objectives of this management zone are:

- Control and removal of exotic species; and
- Restore cleared areas to form contiguous high-quality riparian corridor of SSTF.

vi. *Riparian corridor*

Riparian corridors consisting of ephemeral waterways are located adjacent to the management zones. Revegetation within the riparian corridor is being undertaken to primarily to satisfy legislative requirements for waterfront land under the *NSW Water Management Act 2000*. The riparian corridor consists of a vegetated creek bed and

vegetated creek banks. The riparian corridor will largely be revegetated as River-Flat Eucalypt Forest, which is not listed as a MNES. However, as this community adjoins or intergrades with CPW in floodplain areas of the Cumberland Plain, the species utilised for the creek bank revegetation will largely consist of species common to both communities to allow for appropriate intergrading with adjoining MNES management zones.

The objectives of the creek bed areas are:

- Revegetate areas with native ground layer species able to withstand ephemeral conditions, such as sedges and rushes; and
- Establish native species along the creekbed to enhance substrate stability.

The objectives of the creek banks are:

- Revegetate areas with native canopy, understorey and ground layer species able to withstand ephemeral conditions; and
- Establish native species along the riparian zone to enhance bank stability.

## 3.2 Management Areas within the Subject Site

The areas of MNES and MNES habitat to be managed under this VMP are summarised in **Table 3.2** below. The distribution of the MNES management zones is shown in **Figure 3.1**.

Please note that total areas of CPW, SSTF and riparian vegetation to be planted outlined in **Table 3.2** below differ from totals provided in Section A5 (Table 9) of the preliminary documentation summary letter prepared by Cumberland Ecology (15062-Let10, dated 23 March 2016) as areas of CPW/SSTF to be planted within the Biobank sites and in precincts outside the subject site have been excluded.

**Table 3.2 Areas of Managed Vegetation within the Subject Site**

Precinct	Area (ha) of CPW retained (Zone 1)	Area (ha) of CPW planted (Zone 3)*	Area (ha) of SSTF retained (Zone 5)	Area (ha) of SSTF planted (Zones 6 & 7)*	Area of Riparian Planting (non- MNES)*
Precinct E					
Precinct F				2.18	0.47
Precinct G			7.10	3.14	1.35
Precinct I	1.49	1.06			
<b>Total</b>	<b>1.49</b>	<b>1.06</b>	<b>7.10</b>	<b>5.33</b>	<b>1.82</b>

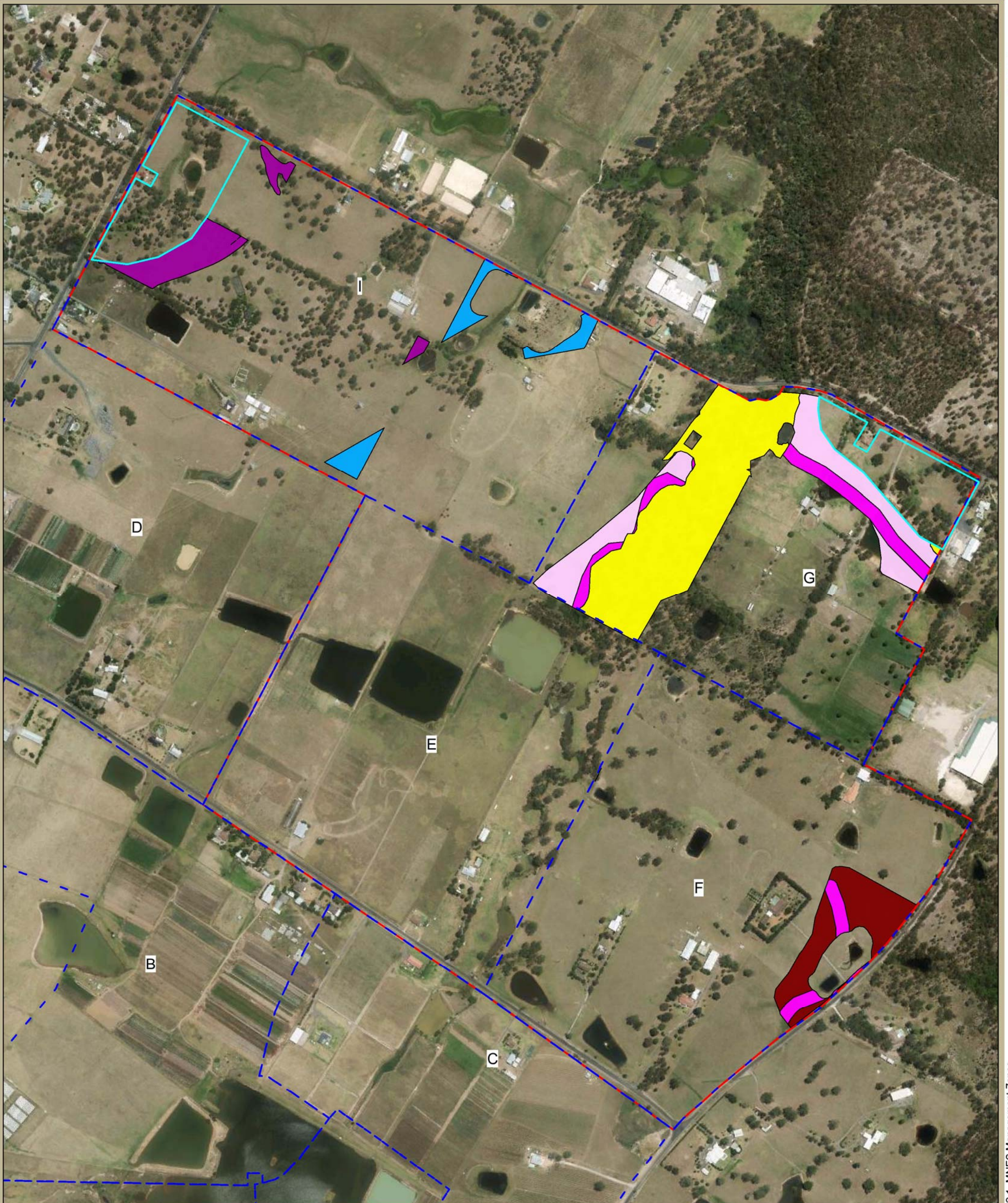
\* Layout as shown in Figure 3.1 subject to change based on final landscape designs

### 3.3 Precinct Specific Management Zones

The Masterplan VMP and **Section 3.1** of this VMP provide the broad, overarching management zones for the subject site. However further precinct specific management zones will be required to be established in each precinct for the specific management of riparian areas, MNES areas and potential APZs.

The requirements of these precinct specific management zones are dependent on final landscape design and layout for each precinct and therefore are outside the scope of this VMP. The precinct specific management zones will be detailed in the precinct specific VMPs that will be prepared to satisfy Council considerations and will give due consideration to the management requirements for MNES and MNES habitat outlined in this VMP. In particular, the precinct specific VMPs will ensure that the minimum areas of CPW/SSTF to be retained/planted, as listed in **Table 3.2** above, are maintained within the respective precincts.





#### Legend

- Subject Site
- Development Precincts
- Proposed Biobank Site

\* Final location/layout subject to change based on final precinct specific landscape plans.

#### Management Zones

- MNES Zone 1
- MNES Zone 3 \*
- MNES Zone 5
- MNES Zone 6 \*
- MNES Zone 7 \*
- Riparian Corridor

Image Source:  
Image © 2015 Aerometrex  
(dated 01-01-2014)

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Figure 3.1. MNES Management Zones

100 0 100 200 300 400 m



## Vegetation Clearing Protocols

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### 4.1 Introduction

This chapter outlines the protocols to be followed during clearing to minimise the impacts on native flora and fauna within the subject site.

### 4.2 Hygiene Protocols

To avoid the spread of *Phytophthora cinnamomi* and other soil borne pathogens, appropriate hygiene procedures and guidelines described in Best Practice Management Guidelines for *Phytophthora cinnamomi* within the Sydney Metropolitan Catchment Management Authority Area (Botanic Gardens Trust, 2008) will be followed.

This will involve the disinfection of all machinery, clothing (such as boots and gloves), and tools which have been in contact with soil with a spray prior to entering and leaving the site.

Recommended disinfectant products include:

- Non corrosive disinfectants including Coolacide®, Phytoclean®, or Biogram® which can be for cleaning footwear, tools, tyres, machinery and other items in contact with soil;
- 70% Methylated spirits solution in a spray bottle which is suitable for personal use (clothing); and
- Sodium Hypochlorite 1%, which is effective, but can damage clothing and degrades rapidly in light.

Additionally, contractors will be required to clean equipment and clothing prior to commencing work and after completion of work, in order to prevent transport of weed propagules.

### 4.3 Marking Limits of Vegetation Clearing

Prior to vegetation being cleared within the subject site, the edge of the vegetation to be cleared will be clearly delineated with either high visibility tape, temporary fencing, or other appropriate boundary markers. To avoid unnecessary damage to vegetation or inadvertent

habitat removal, disturbance is to be restricted to the delineated area. No stockpiling of equipment, soils, or machinery will occur beyond the boundary.

#### 4.4 Fencing of Native Vegetation to be Retained

All native vegetation that is to be retained on site for each stage will be enclosed by metal temporary exclusion fencing to prevent inadvertent damage to vegetation, in particular by machinery. This fencing will remain in place until all works have been finished in the area. No vehicles or machinery will be permitted to enter areas of native vegetation to be retained.

#### 4.5 Pre-clearing Surveys

Within one week prior to the commencement of clearing of a designated area, a pre-clearing survey of the area will be undertaken by a certified ecological consultant. This measure will minimise the risk of birds and/or arboreal fauna nesting between the time of the pre-clearance survey and commencement of clearance works. During the survey, native flora and fauna that have the potential to be disturbed during clearing will be identified.

##### 4.5.1 Flora Pre-clearing Surveys

###### i. Threatened Species

Prior to clearing, a pre-clearing flora survey will be conducted by the certified ecological consultant to search for threatened plant species that have potential to occur, based on habitat available. These include (but are not limited to):

- *Acacia pubescens* (Downy Wattle) – Vulnerable EPBC Act;
- *Pimelea curviflora* var. *curviflora* –Vulnerable, EPBC Act;
- *Pimelea spicata* – Endangered, EPBC Act; and
- *Pultenaea parvifolia* (Sydney Bush-pea) – Vulnerable, EPBC Act.

If a threatened plant species is identified, the numbers of plants will be counted and/or the population estimated/mapped. If significant numbers of any threatened species are recorded (level of significant numbers being species specific), DoEE and/or the NSW Office of Environment and Heritage (OEH) will be consulted to determine the requirement for a translocation program.

If required, a translocation program will be developed in accordance with relevant state and commonwealth guidelines and submitted to DoEE and/or OEH for approval prior to implementation of further works.

*ii. Weeds*

Pre-clearance surveys will be conducted to determine locations of any infestations of significant weeds (noxious weeds as listed under the *Noxious Weeds Act 1993* or Weeds of National Significance (WONS)) requiring specific controls. The locations of any infestations will be recorded and measures for appropriate disposal to minimise the risk of spread of weeds during clearing will be specified prior to clearing. Weed control measures will be species specific and will be conducted by the Bushland Regeneration Contractor (BRC).

**4.5.2 Fauna Pre-clearance Surveys**

*i. General surveys*

Habitat features that have a high potential to support native fauna species will be identified prior to any clearing activities. These include significant rock outcrops and in particular trees bearing hollows that have potential to contain species such as bats, gliders, possums, reptiles and birds. Trees containing hollows or nests that have a high potential to contain fauna will be identified, recorded, flagged with fluorescent marking tape, and marked with a large (>1 m) "H" using spray paint on two sides of the tree.

The location of suitable nearby habitat for the release of fauna that may be encountered during the pre-clearing process will be identified and marked on a map. These relocation areas will be within areas of CPW or SSTF that are to be retained and rehabilitated under this VMP.

The clearing schedule within the various precincts contained within the subject site will vary depending on the staged development of the different precincts. However, within one week prior to any scheduled clearing of trees in the various precincts, a pre-clearing fauna survey will be conducted by the ecologist for the presence of fauna species previously recorded or assessed as likely to occur. This will be undertaken to identify and minimise impacts to resident fauna. To determine fauna usage, the ground around each tree will be inspected for scats, and each tree trunk will be inspected for scratch marks. Any fauna utilising the area will be recorded, and where possible, these will be encouraged to leave the area.

*ii. Grey-headed Flying Fox*

There are no Grey-headed Flying-fox (GHFF) camps in the vicinity of the subject site and wider subject land and therefore no breeding or roosting habitat for GHFF will be impacted by the proposed development. However, as the species can travel up to 50km from camps to forage, individuals in transit may occasionally utilise the subject site for foraging.

As this species emerges at dusk to forage, all vegetation removal works will cease before dusk to minimise the potential risk to GHFF and resume after dawn when foraging generally ceases.

During pre-clearance surveys, the ecologist will note the location of potential feed trees for GHFF. These trees will be examined prior to felling to confirm the absence of potential

roosting vagrants and measures will be implemented to encourage any individuals present to self-relocate prior to felling.

#### **4.6 Salvage of Hollow-Bearing Trees, Hollow-bearing Logs, other Woody Material, and Bushrock**

Fauna habitat features such as tree hollows and logs are to be salvaged, where feasible during clearing and stockpiled for future use in restoration of the CPW and SSTF within the subject site. The placement of salvaged items within the subject site will increase habitat complexity as such items are used by a variety of invertebrate and vertebrate species as microhabitat areas.

Based on data on total length of fallen logs collected from Biobanking plots within the two proposed Biobank sites as well as plots from good quality CPW, as conducted by Cumberland Ecology in other parts of Western Sydney, a minimum total log length of 75m/ha should be placed within retained habitat.

Habitat features are to be stored until such time as restoration of the reconstruction of vegetation commences. Storage should be undertaken within designated stockpile areas within the subject site, with onsite contractors made aware material is to be retained, to prevent loss of stored habitat features prior to utilisation. Placement of stored habitat features within reconstructed areas will be undertaken in co-ordination with the BRC or the ecologist.

All salvageable items will be translocated and placed in areas where they pose no harm to planted vegetation. To allow for distribution of habitat features and prevent clumping of habitat features in one location, large logs should not be placed at densities of closer than 10 m to each other following translocation.

#### **4.7 Seed Collection / Harvest**

Seed collection will be undertaken by a company that specialises in growing endemic native plants from seed collected in bushland areas. This work can be undertaken by the BRC if the BRC chosen has a suitable native plant nursery. Seed collection visits should occur in each season across the subject site to obtain a seed collection from as many native species as possible, as flowering and seed setting times vary with species. Seed must be collected from all strata including grass and herb species. During clearing supervision works the ecologist must collect any seed present on felled trees to be passed on to the BRC or nursery staff.

Seeds collected will be germinated, and grown in a nursery for later planting during bushland restoration works within the subject site. Use of seed sourced on site for plantings will maintain local genetic diversity of species occurring on site.

If in the event the requisite quantum of seeds cannot be collected onsite, then seeds may be collected in the first instance within 10 km of the site. If it can be shown that all reasonable

steps have been taken to source from this radius unsuccessfully, then a larger area can be utilised provided:

- Seeds are sourced from the Cumberland IBRA subregion; and
- Seeds are from species listed in the planting lists in **Appendix B**; or
- Seeds are from species known to occur within CPW and SSTF.

## Weed Management Plan

### 5.1 Introduction

#### 5.1.1 Species Lists

Weeds identified in surveys conducted by Cumberland Ecology make up the weed species lists used for the basis of this Weed Management Plan. A list of control methods for specific weeds recorded during surveys of the subject land is provided in **Appendix C**.

Under the NSW *Biosecurity Act 2015*, State Listed Priority Weeds have specific legal requirements for management and have higher management priorities. State listed priority weeds recorded within the subject site and wider subject land are listed in **Table 5.1** below. These species are also listed as Weeds of National Significance (WoNS) under the National Weed Strategy.

**Table 5.1 State Listed Priority weeds and WONS recorded in the subject land**

Species	Common Name	Category
<i>Asparagus asparagoides</i>	Bridal Creeper	WONS/State Priority Weed
<i>Opuntia stricta</i>	Common Prickly Pear	WONS/State Priority Weed
<i>Rubus fruticosus</i>	Blackberry	WONS/State Priority Weed
<i>Senecio madagascariensis</i>	Fireweed	WONS/State Priority Weed

#### 5.1.2 Best Management Practice

Contractors for weed removal within the subject site will have regard to the following, to minimise impacts upon existing vegetation and habitats:

- The main principles of the Bradley Method of bush regeneration, i.e. not over-clearing (remove only targeted species), employment of minimal disturbance techniques to avoid soil and surrounding vegetation disturbance, and replacement of disturbed mulch/leaf-litter;
- Removal of fruiting/seeding parts of weeds carefully, to minimise spread of plant propagules;

- Use of chemicals and sprays only during suitable weather conditions (i.e. not during wet or windy conditions), and only during appropriate seasons;
- All equipment must be thoroughly cleaned prior to entering the site to minimise contamination;
- Proximity to watercourses and swampy areas; and
- Presence of native fauna or nesting/breeding sites.

### **5.1.3 Weed Control Methods**

Bush reconstruction weed control is to be implemented for all management zones. All weed removal works will be approached using the strategies outlined below.

#### *i. Manual Weed Removal*

Manual removal, or hand weeding, is an effective form of weed control when all viable parts of the plant are removed from the soil (roots, fruiting material and rhizomes) and site. All weeds removed by hand will be handled according to best practice bush regeneration techniques to prevent subsequent seed set from the removed weeds, and the unviable plant material will be retained on site to provide mulch and natural leaf litter to protect the soil surface.

#### *ii. Use of Herbicides*

All herbicides will be used according to recommendations on the herbicide label. Appropriate Personal Protective Equipment (PPE) will be worn and consideration given to time of day, likelihood of rainfall, wind direction and likely impact on native species as per guidelines on the label. Use of glyphosate will be appropriate for most species. Glyphosate is the preferred herbicide for use in environmentally sensitive areas as it is rapidly broken down by microbes in the soil so residue is short lived and will not affect remnant and planted native individuals in the long term following application. In areas near water courses, an appropriate form of the herbicide must be used to minimise impact to aquatic life and amphibians. Herbicide use will not be used within 2 m of the riparian edges. Examples of appropriate herbicide forms are Roundup Biactive and Clearup Bio 360 which have surfactants that are formulated to minimise harm to amphibians. As runoff is a likely way for herbicide residue to enter watercourses, chemical treatment will be avoided prior to or directly after rains.

It is important to note that there can be legal restrictions and permit requirements for use of specific herbicides for specific plants, and chemical labels and permit requirements always need to be researched prior to herbicide application. While the recommended methods for weed treatment detailed in **Appendix C** are effective, some will require a permit to be undertaken. The relevant permit numbers are PER9907, and PER11916. These permits need to be obtained from the Federal Government body, the Australian Pesticides and Veterinary Management Authority.

Manual removal will be an appropriate form of control for some species, and all chemical treatment should be carried out according to best practice guidelines.

Planting will not occur within 10 days of herbicide application.

#### **5.1.4 Types of Weed Control**

##### *i. Primary Weeding*

Primary weeding is the first stage of bushland regeneration and is recommended for management zones 1, 5 and 6. No primary weeding is proposed for Zones 3 and 7 as these areas to be entirely cleared of vegetation and will undergo reconstruction.

Primary weeding should commence within the first month of establishment of work sites for reconstruction within the precinct and will involve techniques such as:

- The selective spraying of weeds, with selective and non-selective herbicides, with a particular focus on targeting weeds listed in **Table 5.1**);
- Cutting/scraping and painting deep rooted woody weeds and climbers with hand tools, chainsaws and brush cutters and painting cut stumps with herbicides containing Glyphosate or Picloram;
- Target drilling and injecting certain large tree weeds such as willow with herbicides such as Glyphosate and a Garlon/diesel mix; and
- Selective hand removal of weeds and wicker wiping of tall herbaceous weeds in situations where damage to proximate, low growing native plants can be avoided.

##### *ii. Maintenance Weeding*

Maintenance weeding will be undertaken in all management zones on a monthly basis for the life of the VMP following reconstruction works or primary weeding, to treat any establishment or regrowth of weeds. To maintain consistency with the Council Masterplan VMP and precinct specific VMPs, this VMP will be implemented for a minimum period of five continuous years upon the completion of the initial reconstruction works for each precinct. After the five-year follow-up and maintenance period has been completed, a review should be conducted to determine on-site maintenance requirements.

Maintenance weeding involves the selective removal or treatment of weeds, whilst allowing planted native plants to increase in size, abundance and percentage cover. Weed control during each site visit should prioritise Noxious Weeds and WoNS, followed by environmental weeds, and then infestations of any weed species within reconstruction areas becoming established to the extent they threaten the viability of native plantings. The follow-up bushland reconstruction works are likely to be required at least every month until weeds are at negligible levels, whereby they do not compete with planted tubestock nor occur in densities greater than 10/m<sup>2</sup>. Site visits may be more frequent or infrequent depending on weed levels.



Woody weeds, climbers, and key herbaceous weeds identified during reconstruction will be subject to a programme of intense follow up weeding on a monthly basis around any patches of planted native herbaceous plants to encourage the spread of the native plant species.

Follow-up weeding will be implemented for a minimum period of five continuous years, upon the completion of the initial reconstruction works within each precinct. After the five-year follow-up and maintenance period has been completed, a review will be conducted to determine on-site maintenance requirements.

## **5.2 Weed Management in the Subject Site**

### **5.2.1 Site Preparation for Bushland Reconstruction Areas**

The directions under the following headings will be undertaken sequentially during site preparation of bushland reconstruction areas.

#### *i. Sediment Fencing*

Areas designated for complete revegetation will require site preparation prior to revegetation. Initially, it will be determined whether the topography of the land will facilitate runoff of surface soil after initial weed management works are completed. In areas where soil runoff is likely to occur, temporary silt sediment fencing will be installed around the area to be revegetated, to prevent soil runoff during rain into drainage lines. Sediment fencing will be installed as close as possible to fences installed initially to delineate the reconstruction areas and prevent damage to native plantings by easy traversal of areas by members of the public.

#### *ii. Installation of Tree Guards around Native Plants*

Prior to commencing the initial weed management, each area in which bushland reconstruction is to be undertaken will be searched for remnant, endemic native herbs and grasses occurring throughout the area. These plants will have a plastic tree guard around them where located. This will protect them from herbicide drift during spraying.

#### *iii. Initial Weed Treatment*

After installation of sediment fencing and installation of tree guards around native herbs and grasses has been completed, initial weed treatment will commence. This will consist of spraying the entire vegetative surface with Glyphosate 360g/L at a concentration of 10 mL herbicide to 1L of water. This strength is commonly used in bushland regeneration works as it will effectively kill most herbaceous weed species. A marker dye will be used in the herbicide solution to ensure areas of exotic grasses and herbs are not missed. Knapsack sprayers with a spray cone to direct the spray towards the ground will be used to prevent herbicide drift into adjacent vegetated areas.

Following the initial spraying of exotic grassland areas in which revegetation is to take place the site will be left for three weeks to allow time for treated weeds to die back. After this period the entire area will be resprayed with Glyphosate again, with a focus made on treating

any exotic plant species that still have green colouring left in foliage, and any juvenile germinated exotic grasses.

iv. *Laying of Weed Suppression Materials*

Several days after the second application of herbicide across the bushland reconstruction areas weed suppression materials will be installed across the entire soil surface. This will inhibit germination rates of exotic weed seed in the soil, inhibit vegetative regrowth of resilient exotic weed species, and prevent soil runoff of surface soils during rain in the period until native plantings have become established enough to prevent erosion. Weed suppression material can be a form of biodegradable matting such as jute matting, or mulch.

Jute matting is a commonly used biodegradable form of matting for bushland regeneration works. The heavier available forms of this product suppress weed growth. Holes would be needed to be cut in the matting if used to allow it to be placed around remnant native plant individuals occurring on the site, and holes would also need to be cut to plant tube stock into. As this is quite labour intensive, the most cost-effective method of weed suppression for the reconstruction areas would be using mulch.

Mulch can be easily laid across the study area in areas that contain no native plants. In areas containing native plants, the mulch can be spread on the ground surface around the occurrences of remnant native plants. If mulch is used a certified weed-free mulch of known provenance must be used. While mulch or any other form of weed suppressing layer across the ground will inhibit regrowth of weeds, it will also inhibit regrowth of native plants from seed. For this reason, weed suppression matting or mulch must only be used initially to establish the revegetation site while intensive weed control is needed, and be allowed to biodegrade over time without being reapplied, unless required during the establishment period. Following application of weed suppression materials the reconstructed bushland areas will be planted out with native plants as per lists provided in **Appendix B**.

Tree guards will remain installed around remnant, native herbaceous plants until such time as they mature and set seed. This will prevent predation by exotic herbivorous animal species such as rabbits before they contribute seed to the soil seed bank, and protect them from herbicide drift during maintenance site visits by the bushland contractor.

### **5.2.2 Initial Weed Treatment of Regeneration Areas**

Weed control methods for all weeds recorded as occurring on the site are provided in **Appendix C**.

i. *Noxious Weeds*

The first priority for weed treatment in regeneration areas will be targeting mature individuals of the three Noxious weed species recorded on the site, *Rubus fruticosus* (Blackberry), *Asparagus asparagoides* (Bridal Creeper), and *Ligustrum sinense* (Small-leaved Privet). These species are perennial and take several years to reach reproductive maturity so are easily controlled providing juveniles are continuously eradicated before reaching maturity.

ii. *Primary Weeding*

Following control of mature individuals of the noxious weed species, primary weeding will be undertaken throughout the regeneration areas. The aims of primary weeding will be:

- Eliminating any woody weed species;
- Eliminating any mature Moth Vine (*Araujia sericifera*) individuals – This species can cover trees after several years of growth and outcompete them in access to light resources. The fruit pods are large and contain many wind dispersed seeds;
- Eliminating mature Fireweed (*Senecio madagascariensis*) individuals – This species is listed as a Weed of National Significance, is quick to mature and has wind dispersed seed, making it difficult to eradicate; and
- Targeting and eliminating any large, dominant infestations of exotic herbs and grasses. Prior to chemical treatment any seed on mature exotic plants will be bagged to prevent seed fall and addition to the exotic soil seed bank of propagules.

In areas where remnant native herbs and grasses occur sporadically amongst dominant infestations of exotic weeds, plastic tree guards will be installed around them to protect them from herbicide drift during spraying. The goal of primary weeding for the regeneration areas will be to eliminate all the larger weed infestations to allow planting to take place to fill gaps in the understorey and canopy without competition from weed species.

During site visits for primary weeding the bushland maintenance team will start from one end of each regeneration area and work towards the other end to achieve the aims listed above through the entirety of each area, and prepare the site for planting. Spot spraying with herbicide will be used in any areas where there is negligible risk to collateral damage of native vegetation as it is more cost and time effective than hand weeding techniques.

### **5.2.3 Ongoing Weed Maintenance in Reconstruction and Regeneration Areas**

Weed suppression methods such as mulching/matting will suppress mass regrowth of weeds in reconstruction areas initially, but not entirely prevent regrowth of weeds. The most cost and time effective method of controlling weed regrowth in a revegetation area or weedy bushland area is by spraying a non-selective Glyphosate herbicide. A list of effective methods for control of weeds on site is found in **Appendix C**.

Ongoing maintenance of the reconstruction and regeneration areas will occur for a five year period following commencement of work in the respective precinct. Each area will be covered in its entirety once every month, to diminish the soil seed bank of exotic weed species present on site. In order to eliminate the occurrence of these species they need to be controlled before they have a chance to set seed, otherwise progress on the site will not be made.

Tree guards will remain around native remnant plants, and native plants that have been planted, for at least 6 months to protect them from herbivory. Rabbits can devastate revegetation areas soon after planting, if tree guards are not used. Tree guards will also allow herbicide to be used for control of the majority of regrowth weeds, without damage to native plants by herbicide drift.

The following sequential steps will be implemented to manage each area of the site effectively for each site visit:

1. Initially the bushland regeneration team visiting the site will sweep from one end of each area to the other. During this sweep weeds occurring within each tree guard alongside native plants will be removed by hand and any weed occurring within a patch of dominant native plants (such as a patch of grasses). During this sweep regrowth individuals of harder to manage weeds that require other techniques such as sawing, digging, drilling etc. will be targeted.
2. A member of the team will then sweep the entire area, spraying all regrowth weeds between native plantings/remnant natives in open areas with herbicide, and spot spraying where possible in regeneration areas.

It is important during site visits for ongoing weed maintenance that as many weed species as possible are controlled. This will minimise maturity and set seed of weeds between site visits. Some weed species such as *Bidens pilosa* (Cobbler's Pegs), and *Ehrharta erecta* (Panic Veldtgrass) are prolific seeders, and many exotic plants can have seed that remains viable in the soil for long periods of time. In order to effectively diminish the soil seed bank occurrences of exotic species it is important that individuals are not allowed to set seed.

During site visits for weed control, noxious weeds and WONS (**Table 5.1**) will be prioritised for control. Individual plants of these species on site must not be allowed to achieve a reproductive stage in their life cycles.

Temporary sediment fencing should be retained until it is determined plants have established enough to prevent surface soil runoff.

### 5.3 Pest Species Management

Rabbits can potentially devastate planted tubestock. Whilst rabbit numbers are considered low within the subject site, it is important to consider their potential impacts and propose control methods for the species. Impacts of rabbits will be effectively mitigated by using tree guards for planted tubestock.

If more than 25% of planted tubestock are demonstrated to be impacted by rabbits, then a baiting program using Pindone will be implemented to reduce the population of the species.

## Reconstruction and Regeneration Plan

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### 6.1 Aims

This chapter provides details of restoration specific to the MNES and MNES habitat as well as guidelines for ongoing maintenance of vegetated areas (including weed control).

The aim for the vegetation to be retained/reconstructed is to achieve the following performance based outcomes:

- Control threats either affecting the health of native vegetation or inhibiting its future regeneration potential;
- Increase species diversity and percentage cover of planted native vegetation;
- Improve the resistance of native vegetation to future weed colonization and establishment and related threats, by initiating the two above aims; and
- Use measurable indicators to monitor planting success and regeneration responses, and to assist in prioritizing bushland regeneration works during the proposed works program.

### 6.2 Recommended Revegetation techniques

Appropriate plants species for CPW and SSTF within the subject site are provided in **Appendix B**, and are to be used for selection for re-vegetation of relevant management zones. Plantings to be planted will be sourced from local provenance; these may come from seed collections or cuttings from within the existing remnant vegetation.

#### 6.2.1 *Species Selection and Planting Densities*

##### *i. Species Selection*

A mix of local native trees, shrubs, and ground layer plants will be replanted at the specified densities outlined below. All plants will be disease and pest-free, hardened off and well-watered at the time of planting. All plants are to be provided in a healthy condition. They must have good root development and a sturdy shoot system.

Final species selection will be based upon:

- Availability of seed material;
- Exclusion of plants likely to naturally regenerate on the site; and
- Previous experience with species re-vegetation performance.

ii. *Planting Densities*

a. CPW

The recommended reconstruction planting specifications for CPW are as follows:

- Canopy Trees @ 1 unit / 16m<sup>2</sup>
- Shrubs @ 1 unit / 10 m<sup>2</sup>
- Groundcovers @ 8 unit / 1m<sup>2</sup> planted in clumps/thickets over.

b. SSTF

The recommended reconstruction planting specifications for SSTF are as follows:

- Canopy Trees @ 1 unit / 10m<sup>2</sup>
- Shrubs @ 2 unit / 5 m<sup>2</sup>
- Vines @ 1 unit / 5 m<sup>2</sup>
- Groundcovers @ 4 unit / 1m<sup>2</sup> planted in clumps/thickets over.

Groundcover and shrub planting densities will be reduced in any potential APZ or fuel reduction areas. These areas, if required, will be identified in the Precinct specific VMPs and planting densities will be adjusted in accordance with Bushfire requirements.

### **6.2.2 Characteristic Planting Units**

Species will be planted in characteristic planting units to correspond with the topology, aspect, soil type and proximity to water.

Grasses will be planted in clumps of 3+ (spaced 15–20 cm apart within clumps) to generate physical / structural support for each other and microclimates. Wind pollinated grasses such as *Themeda australis* are particularly suited to planting in clumps, as this aids fertilisation and creation of a natural grassland understorey within the restoration areas.

### **6.2.3 Plant Supply**

Local native plant species will be collected using principles prescribed in '*Bringing the Bush back to Western Sydney*' (DIPNR 2003). Seeds and vegetative propagules must be of local provenance from within The Hills Shire LGA, and not more than 10 kilometres from the site, be used for collection and propagation in a local commercial or community nursery.

It may be necessary to get the required amounts of seed and vegetative material contract-collected and grown-on by specialist nurseries. Local native plants will be grown in "Hiko" tube, maxi cell or viro-tube, or Forestry Tube-type containers.

#### **6.2.4 Re-vegetation Objectives to Maximise Fauna Utilisation**

In order to improve habitat on site for fauna, plant species will be chosen that provide food, shelter and refuge opportunities for native and threatened fauna. Plant species selection has taken account of the following principles for CPW and SSTF:

##### *i. Cumberland Plain Woodland*

- Increase winter flowering Eucalypts for threatened bird species as well as GHFF;
- Include marsupial feed trees such as *Eucalyptus punctata* (Grey Gum) and *Eucalyptus tereticornis* (Forest Red Gum);
- Increase trees and groundcovers favoured by arboreal mammals such as flowering Eucalypts; and
- Include species that mature to become good hollow-bearing trees (such as eucalypts) for hollow-dependent fauna such as parrots, owls, gliders and microchiropteran bats.

##### *ii. Shale Sandstone Transition Forest*

- Increase shrub species to increase small bird habitat; and
- Increase Casuarina species that may provide forage resources for threatened cockatoos.

### **6.3 Regeneration Site Preparation**

Site preparation activities for Zone 1 and Zone 5 will include preliminary weed control. Areas with currently existing canopy coverage will largely be left to re-generate naturally with ongoing and sustained weed eradication.

Recommended strategies should include:

- Initial and ongoing control of weeds and competing grasses using bushland regeneration techniques and conventional best practice chemical and physical strategies;
- Stabilising soils within areas using square jute fibre mats, (or woodchip leaf mulch) to in areas following weed control where regeneration is not occurring;

- Planting of tree, shrubs, and ground cover species only when required to fill strata gaps if natural regeneration does not occur following weed control, and to increase species diversity in depauperate areas; and
- Maintaining regeneration treatments (weeding, replacing dead plantings and repairing / replacing weed mat/mulch if need during the planting establishment period), as a part of an ongoing maintenance programme.

Jute matting/mulching must only be used in remnant bushland areas to curtail erosion in cases where natural regeneration is not occurring. However, it is preferable to use lengths of natural logs from felled trees elsewhere, pinned into the ground with wooden stakes, and further stabilise surface with plantings. The logs and wooden stakes will decompose over time during which plantings will grow to stabilise soils.

## 6.4 Maintenance of Regeneration Zones

After Regeneration Site Preparation and planting works have been completed in Zone 1 and Zone 5, treated areas will be maintained by appropriately qualified personnel, selectively spot spraying and hand weeding around native plants, watering plants and replacing dead planting if needed.

Re-growing environmental weeds such as vines, woody trees and shrubs, broadleaf annuals and naturalised grasses will be closely monitored and controlled using ecologically sensitive bushland regeneration hand weeding and spot-spraying methods, to ensure adequate weed control and native plant establishment. Weeding within regeneration areas using selective herbicides will be required.

## 6.5 Reconstruction Site Preparation

Site preparation activities for Zone 6 will also include preliminary weed control. Areas within this zone will be identified where full reconstruction is needed, and areas will be identified where sufficient native flora remnants persist in the shrub/ground layer to justify retention of layers, weed control, and revegetation to fill gaps in strata. Zone 3 and Zone 7 areas will require complete reconstruction.

The replanting of individuals from seed or tube stock will require the treatment of soils, the installation of protective plant fencing, and ongoing maintenance treatments such as watering and weeding.

Reconstruction strategies will include:

- Initial and ongoing control of weeds and competing grasses using bushland regeneration techniques and conventional best practice chemical and physical strategies;
- Specifically collecting local plant seed and subsequent propagation in cell-grown seedling containers;



- Treatment of soils within each planted tube stock plant hole with a plant establishment aid that contains a mix of materials such as slow and quick release fertilisers, water holding crystals, rooting hormones and wetting agents, (i.e. products such as Terra Cotten by TC Advantage Pty Ltd or Sure Start by Barmac). These agents assist in establishing newly installed plants and can reduce establishment watering resources by up to 50%;
- Installing suitable propagated cell-grown seedlings, using specified techniques, species composition schedules and rates, using hand planting or mechanical planting techniques;
- Stabilising soils and suppressing weeds around individual reconstruction plantings using products, such as 40cm square jute fibre mats or clean straw or woodchip leaf mulch to a 50cm diameter and 75mm depth;
- Protecting individual plantings with a tree guard from feral animal grazing, frost and maintenance herbicide spraying overspray. Bamboo stakes 3 x 10-12mm x 750 mm and 1 x 350 mm x 450 mm plastic tree guards are suitable for this purpose; and
- Maintaining reconstruction treatments (including watering, weeding, replacing dead plant material and repairing / replacing weed mat/mulch), as a part of an ongoing maintenance programme.

## 6.6 Maintenance of Reconstruction Zones

After planting works have been completed, treated areas will be maintained by appropriately by qualified personnel, selectively spot spraying and hand weeding around native plants, watering plants and replacing dead plants as needed.

Provision will be made to irrigate newly reconstructed areas, as required, in the first 3 months after installation, (on at least 4-5 occasions, depending on rainfall conditions, more watering if required). Irrigation water may be sourced by pumping from the river and local dams. A permit from the NSW Office of Water may be sought to use water for watering-in newly installed plants.

Re-growing environmental weeds such as vines, woody trees and shrubs, broadleaf annuals and naturalised grasses will be closely monitored and controlled using ecologically sensitive bushland regeneration hand weeding and spot-spraying methods, to ensure adequate weed control and native plant establishment. Weeding inside each planting bag by hand or selective herbicides will be required, as well as in an approximate 50 cm radius around the outside of each plant and tree guard.

Plants that have died due to drought or pest and disease damage will be replaced as required. Plants that are observed to have died will be replaced by the bushland maintenance team with a planting of the same form during the next site visit by the team. At

the end of the maintenance period the density of living planted plants must be as outlined in **Section 6.2.1 ii.**

## **6.7 Ongoing Management during Operation of the Study Area**

A five year maintenance period from commencement of work for each respective precinct has been allowed for this plan. Maintenance works are outlined below.

### **6.7.1 Weed Control**

This is the greatest component of long-term management at the site. Eradication of noxious and / or serious weeds will occur along with the suppression of introduced grasses, annuals, vines and perennial weeds. A strategic weed control plan is included in this report for a maintenance period of five years.

### **6.7.2 Monitoring of Regenerating Vegetation**

Inspection of the regeneration areas will be undertaken by the supervisor / project manager monthly thereafter for the duration of the project. Areas where noxious / serious weeds have been treated will be inspected on a fortnightly basis following initial treatment to assess when and if repeat treatments are necessary. This can be done by maintenance personnel during normal maintenance tasks and reported back to the supervisor / project manager.

### **6.7.3 Management of Ground Fuel Loads**

Following the establishment of canopy plantings, a ground fuel assessment will be undertaken by a suitably qualified bushfire ecologist. This assessment will inform the future management of the site with regards to the manual removal of ground fuels and hazard reduction burns. The assessment will provide clear directions as to the amount of ground fuel to be removed annually, and a timeline for works. Annual monitoring will be undertaken by a bushfire ecologist to ensure that targets are being met.

## **6.8 Schedule of Works**

This Reconstruction and Regeneration Plan covers work to be carried out over five years from commencement of work for each respective precinct. The measures that are planned over this time period within all management zones are as follows:

*i. Short term: years 1 and 2 (from commencement of work in the relevant precinct)*

- Fencing;
- Weed control;
- Planting of canopy species;
- Planting of canopy, shrub, and groundcover species;

- Replacement of any tube stock individuals that have died between site visits;
  - Management of fuel loads within APZs; and
  - Monitoring, management and reporting.
- ii. *Long Term: years 3, 4, and 5 (from commencement of work in the relevant precinct)*
- On-going weed control in accordance with weed management practices;
  - Replacement of any tube stock individuals that have died between site visits; and
  - Monitoring, management and reporting.

## 6.9 Signage

All areas within the subject site adjacent to retained or revegetated CPW and SSTF will have signage installed. The aim of the signage is to inform residents, public or construction workers of the presence of environmentally significant vegetation.

Signs will be made of a durable material, have a minimum size of A4 (210mm x 297mm) and contain the following (or similar) permanent and legible wording:

*"The vegetation within bushland is protected. Activities such as firewood collection, bushrock removal, picking of native flowers and dumping of garden waste are prohibited".*

The signs will be installed at all public entry points to vegetation areas. The location of public entry points will be determined at the precinct stage of development, and will be clearly identified on maps within subsequent precinct level VMPs

## Monitoring, Risk Assessment and Reporting

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A project manager/supervisor with the BRC be assigned to co-ordinate, supervise and manage all works and correspondence with respect to the reconstruction of the subject site. The project manager must be available for the duration of the project and become familiar with the site and progress of all aspects of works undertaken.

The project manager will be responsible for allocation of maintenance tasks to personnel in response to establishment issues and other factors as monitoring results are reported (e.g.: plant losses/re-planting, weed control, irrigation). Regular monitoring and feedback from personnel will assist in the allocation of labour relative to available funds.

### 7.1 Monitoring Program

The following activities are to be conducted as part of the monitoring program:

- Establish a series of fixed monitoring points within the subject site. Additional points can be established over the life of the VMP for areas with particular weed problems;
- Take photographs annually from each monitoring point. Compare photographs to previous years;
- Use the photograph point to form a corner of a 20 x 20 m quadrat at each monitoring point. Note any weeds occurring in the quadrat and state relative abundance of weed species (using Braun-Blanquet scale), as well as projective foliage cover of native species in each strata. Record numbers of failed plantings in each quadrat; and
- Note any other weed outbreaks in the reconstruction areas. This can be done while walking between monitoring points.

Monitoring will be conducted before weed control commences, then once every month while reconstruction works are undertaken. Once initial plantings are complete, monitoring will be conducted every three months for the next year, then every six months after that for the life of the VMP.

During the period of six-monthly monitoring, if maintenance weeding is conducted, each patch of land where weed control has occurred will be checked approximately a month afterwards, or after rain, in order to determine whether more weeding is required.

The locations of where monitoring points are to be established will be clearly identified on maps within subsequent precinct level VMPs.

## 7.2 Risk Assessment

The main risks identified for this VMP are weed invasion and death of plantings due to drought. This Risk Assessment also assumes that the VMP has been implemented appropriately as specified.

As the VMP contains detailed specifications for weed control, including ongoing maintenance and monitoring, the likelihood of weeds causing a risk to the objectives of the VMP is considered unlikely.

With the implementation of the monitoring and maintenance program as specified in the VMP, the consequence of a weed outbreak is considered to be moderate. If the VMP is implemented appropriately, there will be little opportunity for weeds to proliferate un-noticed until a more severe consequence is reached. Accordingly, the level of risk for weed invasion is considered to be low. Appropriate contingency measures have been specified in the table to manage this risk including increased frequency of weed control visits or additional weed control measures, should that be required.

It is more difficult to predict adverse weather conditions such as drought, and therefore the likelihood of drought causing death to newly established native plants is considered to be possible. The consequence has been assessed as moderate, as this risk can be addressed relatively easily by replanting any plants that have died. Due to the higher likelihood of this occurring, the risk has been assessed as medium. Appropriate contingency measures have been specified in the table to manage this risk including increased frequency of watering.

The Risk Assessment for each management zone is summarised in Table 7.1 below

**Table 7.1 Risk Assessment and Management**

Objective	Event or circumstance <sup>1</sup>	Likelihood	Consequence	Risk level	Trigger	Contingency/s	Related monitoring activity
<b>Zone 1</b>							
Retain and protect existing CPW remnants in the zone	Damage from the public accessing this area	Unlikely	Moderate	Low	Damage noted during monitoring visits	Construct permanent exclusion fence	Monitoring Program as outlined in Section 7.1
	CPW remnants degrade due to weeds	Unlikely	Moderate	Low	Increased abundance/diversity of weeds recorded during monitoring visits	Implement additional weed control measures/increase frequency of maintenance until weeds are below initial levels	Monitoring Program as outlined in Section 7.1
Control exotic weed species	Weeds persist and proliferate	Unlikely	Moderate	Low	Increased abundance/diversity of weeds recorded during monitoring visits	Implement additional weed control measures/increase frequency of maintenance until weeds are below initial levels	Monitoring Program as outlined in Section 7.1
Supplement natural regeneration with native vegetation	Native vegetation planting fails due to drought, grazing or	Possible	Moderate	Medium	Death of planted native species and/or lack of regeneration noted during	Replacement plantings undertaken.	Monitoring Program as outlined in

**Table 7.1 Risk Assessment and Management**

Objective	Event or circumstance <sup>1</sup>	Likelihood	Consequence	Risk level	Trigger	Contingency/s	Related monitoring activity
planting where required	weed invasion				monitoring visits.	Additional maintenance visits scheduled into the monitoring program for watering	Section 7.1
<b>Zone 3</b>							
Control and remove exotic weed species	Weeds persist and proliferate	Unlikely	Moderate	Low	Increased abundance/diversity of weeds recorded during monitoring visits	Implement additional weed control measures/increase frequency of maintenance until weeds are below initial levels	Monitoring Program as outlined in Section 7.1
Restore cleared areas to form contiguous high-quality riparian corridor of CPW	Cleared areas fail to regenerate, plantings fail to establish	Possible	Moderate	Medium	Death of planted native species and/or lack of regeneration recorded during monitoring visits.	Replacement plantings undertaken. Additional maintenance visits scheduled into the monitoring program for watering	Monitoring Program as outlined in Section 7.1
<b>Zone 5</b>							
Retain and protect existing SSTF remnants in the zone	Damage from the public accessing this area	Unlikely	Moderate	Low	Damage recorded during monitoring visits	Construct permanent exclusion fence	Monitoring Program as outlined in Section 7.1
	SSTF remnants	Unlikely	Moderate	Low	Increased	Implement additional weed	Monitoring

**Table 7.1 Risk Assessment and Management**

Objective	Event or circumstance <sup>1</sup>	Likelihood	Consequence	Risk level	Trigger	Contingency/s	Related monitoring activity
	degrade due to weeds				abundance/diversity of weeds recorded during monitoring visits	control measures/increase frequency of maintenance until weeds are below initial levels	Program as outlined in Section 7.1
Control exotic weed species	Weeds persist and proliferate	Unlikely	Moderate	Low	Increased abundance/diversity of weeds recorded during monitoring visits	Implement additional weed control measures/increase frequency of maintenance until weeds are below initial levels	Monitoring Program as outlined in Section 7.1
Plant canopy species where significant gaps exist in the canopy	Planted canopy trees fail to survive due to drought, grazing or weed invasion	Possible	Moderate	Medium	Death of planted canopy species recorded during monitoring visits.	Replacement plantings undertaken.  Additional maintenance visits scheduled into the monitoring program for watering	Monitoring Program as outlined in Section 7.1
Supplement natural regeneration with native vegetation planting where required	Native vegetation planting fails due to drought, grazing or weed invasion	Possible	Moderate	Medium	Death of planted native species and/or lack of regeneration recorded during monitoring visits.	Replacement plantings undertaken.  Additional maintenance visits scheduled into the monitoring program for watering	Monitoring Program as outlined in Section 7.1



**Table 7.1 Risk Assessment and Management**

Objective	Event or circumstance <sup>1</sup>	Likelihood	Consequence	Risk level	Trigger	Contingency/s	Related monitoring activity
<b>Zone 6</b>							
Control exotic weed species	Weeds persist and proliferate	Unlikely	Moderate	Low	Increased abundance/diversity of weeds recorded during monitoring visits	Implement additional weed control measures/increase frequency of maintenance until weeds are below initial levels	Monitoring Program as outlined in Section 7.1
Retain native, remnant elements of ground layer and understorey where possible	Native remnant elements degrade or are lost due to events such as fire, weed invasion, disturbance by humans.	Unlikely	Moderate	Low	Reduced abundance/diversity of existing native remnant elements recorded during monitoring visits	Replacement plantings undertaken or increased weed control if required.	Monitoring Program as outlined in Section 7.1
Revegetate areas with a diverse array of native canopy, understorey, and ground layer species	Native vegetation planting fails due to drought, grazing or weed invasion	Possible	Moderate	Medium	Death of planted native species and/or lack of regeneration recorded during monitoring visits	Replacement plantings undertaken.  Additional maintenance visits scheduled into the monitoring program for watering	Monitoring Program as outlined in Section 7.1
<b>Zone 7</b>							
Control exotic weed species	Weeds persist and proliferate	Unlikely	Moderate	Low	Increased abundance/diversity of weeds recorded during	Implement additional weed control measures/increase frequency of maintenance	Monitoring Program as outlined in

**Table 7.1 Risk Assessment and Management**

Objective	Event or circumstance <sup>1</sup>	Likelihood	Consequence	Risk level	Trigger	Contingency/s	Related monitoring activity
Restore cleared areas to form contiguous high-quality riparian corridor of SSTF	Cleared areas fail to regenerate, plantings fail to establish.	Possible	Moderate	Medium	Death of planted native species and/or lack of regeneration recorded during monitoring visits.	<p>monitoring visits</p> <p>until weeds are below initial levels</p> <p>Replacement plantings undertaken.</p> <p>Additional maintenance visits scheduled into the monitoring program for watering</p>	<p>Section 7.1</p> <p>Monitoring Program as outlined in Section 7.1</p>

### 7.3 Reporting

A brief and concise report recording the implementation of the VMP will be submitted every 12 months from the commencement of management works for the life of the VMP. This report will be conducted in conjunction with any precinct specific VMP reporting requirements prepared to fulfil Council conditions and will be provided to Council and DoEE.

The report will:

- Describe the reconstruction/revegetation works undertaken;
- State the findings of the monitoring activities including results and analysis of the performance criteria;
- Discuss any problems encountered in implementing the VMP; and
- Recommend any adaptations or additions to the VMP.

The report will contain the photographs, as well as a short description of weeds in each quadrat and a short comparison of the photographs to the previous years. Any other notable occurrences of weeds will also be reported. The report will recommend and prioritise areas where weed control should be targeted and replanting should occur, based on the performance criteria. Where feasible, monitoring reports between precincts will be combined.

The reports will also be published on the proponents' website in accordance with the requirements of Condition 9 of EPBC 2014/7119. Accurate records of all activities associated with or relevant to the conditions of approval, which includes all measures taken to implement all management plans required by the approval will be maintained in accordance with the requirements of Condition 8 of EPBC 2014/7119.

### 7.4 Adaptive Implementation Strategy

An adaptive implementation strategy will be used to ensure monitoring, risk management, reporting and review activities are coordinated, scheduled and implemented. In particular, this strategy will ensure that:

- The VMP is subject to continuous improvement processes to achieve its objectives;
- Uncertainty, and limitations to information used in formulating the VMP, are reduced over time, including through implementing the plan and new information derived from external sources (e.g. academic literature, EPBC policy statements); and
- Risks of plan failure are periodically reviewed, including in response to changing circumstances or contingency responses.

The VMP will be reviewed annually in conjunction with the annual monitoring report (see **Section 7.3**) to ensure that the objectives of the plan are being met, and that measurable outcomes are being achieved. At this time, any additional information that becomes available regarding the matters addressed in the VMP will also be reviewed. In particular, this includes the Grey-headed Flying-fox, CPW and SSTF. Examples of relevant literature that would be reviewed include changes to listing information and academic literature on the ecology or natural history of these entities. Risks to plan failure (as identified in **Table 7.1**) will also be reviewed at this time, and any additional suitable responses to these risks will be identified, as well as any inappropriate responses currently listed.

Where new information or site specific experience indicates that the methods or contingency measures specified in the VMP should be changed in order to better achieve the environmental objectives of the plan, or additional risks are identified, then the VMP will be updated by a suitably qualified environmental practitioner and the revised plan will be submitted to DoEE for approval. This will ensure that the VMP remains current and consistently represents latest best practice techniques and reflects the latest understanding of the biological entities it has been prepared to manage. It will ensure that site specific experience is captured and incorporated into the VMP so that the most effective methods are utilised. It will also ensure that all risks have been identified and effective, contemporary contingency responses have been prepared to deal with them.

## Timing and Responsibilities

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The subject site is to be managed in a series of phases as follows:

- Phase 1 – Site Preparation
- Phase 2 – Restoration Works Commence
- Phase 3 – Maintenance
- Phase 4 – Monitoring and Reporting

Timing and responsibilities at each phase of management within the subject site are shown within **Table 8.1**. These tables assign each activity for the subject site within each phase to those responsible. It should be noted that timing of the various phases is likely to differ between the four precincts that form the subject site.

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Phase 1 Site Preparation						
Zones 1, 3, 5, 6, 7	Seed Collection	Bush Regeneration Contractor	Seed collected from native plants and germinated	Species list of all seeds collected includes all species present on site prior to clearing.	Increase seed collection or source additional seed from local nursery if seed isn't available on-site.	Prior to commencement of works for the respective precinct
All areas adjacent to vegetation to be retained within Zone 1, 5, and 6.	Delineation of clearing boundary	Property Owner or Subcontractor	Marking using GPS and high visibility tape, fencing and boundary markers.	All clearing boundaries have been clearly marked and photographs taken for documentation.	Delineate all clearing boundaries.	Before construction works commence

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Zones 1, 3, 5, 6, 7	Establish fixed monitoring points	Bush Regeneration Contractor or Ecologist	Using star pickets and GPS establish a series of monitoring sites that can be used for photograph comparison, measuring weed and plant retention.	All monitoring points have a star picket installed and photographs taken for documentation.	Install star picket at all monitoring points.	Prior to commencement of Bushland Restoration and Weeding works
Zones 1, 5, 6	Fence installation to delineate and protect retained native vegetation	Property Owner or Subcontractor	Metal temporary fence installed around existing native vegetation to exclude vehicles and machines for the duration of works	Fencing has been installed around all areas of native vegetation and photographs taken for documentation.	Install fencing around all areas of native vegetation.	Prior to construction works commencing



**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
All areas – prior to any vegetation clearing	Flora Pre-clearing Surveys	Ecologist or Botanist	Identify any threatened plant species within areas. If encountered, Threatened plants will be counted and/or population estimated and considered for Translocation. All records will be reported to OEH and DoEE.	Pre-clearing surveys are completed and results are documented.	Undertake pre-clearance surveys.	Prior to any staged vegetation clearing.
All areas with canopy species to be felled	Salvage Habitat Features	Property Owner and/or Subcontractor	Tree hollows, Log hollows, bush rock, and other suitable material will be salvaged and stockpiled for future use in revegetation areas and for habitat complexity.	Salvage habitat features have been salvaged and stockpiled. Details on the number of items and type are recorded.	Stockpile all salvage habitat features and record the number and type of items stockpiled.	1-2 weeks after Clearing.

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
All areas adjacent to native vegetation to be retained	Installation of signage identifying areas of bushland regeneration	Property Owner or Subcontractor	All areas adjacent to native vegetation to be retained have signage installed.	Signs have been installed and locations documented.	Install signs in appropriate area.	Prior to commencement of Phase 2.
All areas adjacent to native vegetation to be retained	Implementation of appropriate sediment/erosion controls	Property Owner or Subcontractor	Adequate controls are implemented so no erosion or sedimentation occurs into areas of bush land regeneration.	Photograph at each monitoring point.	Installation of additional sediment/erosion controls and/or fix existing controls.	Prior to any staged vegetation clearing.
Phase 2 - Restoration Works Commence						
Zones 1, 3, 5, 6, 7	Fixed Point Monitoring.	Bush Regeneration Contractor	Photographs of fixed monitoring sites before initial weeding.	Photographs have been taken.	Take photographs.	Prior to commencement of restoration works for each area.

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Zones 1, 3, 5, 6, 7	Carry out primary weeding.	Bush Regeneration Contractor/Botanist	Main weed infestations and noxious weeds and WONS removed - Reproductively mature plants absent from site.	Primary weeding completed and documented.	Targeted weeding	First month of restoration works for each Zone.
Zones 1, 3, 5, 6, 7	Fixed Point Monitoring.	Bush Regeneration Contractor	Photographs of fixed monitoring sites prior to weeding each month.	Photographs have been taken.	Take photographs.	Once a month for duration of VMP restoration works.
Zones 1, 5	Revegetate where natural regeneration has not occurred, or in depauperate areas not representing diversity of intact SSTF/CPW.	Bush Regeneration Contractor	Native plants have been planted (species from Appendix B) in areas where there are gaps in any vegetation strata in which natural revegetation has not occurred following primary weeding.	Revegetation has occurred and been documented.	Undertake revegetation works.	6 months after commencement of weed control.

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Zones 3, 6, 7	Revegetate reconstruction areas. In this zone canopy, small tree, shrub, and some ground cover CPW species will need to be planted along the riparian corridor. Plantings may need to be undertaken in various strata.	Bush Regeneration Contractor	Native plants have been planted (species from Appendix B) in all vegetation strata.	Revegetation has occurred and been documented.	Undertake revegetation works.	Immediately upon establishment of reconstruction areas.

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Zones 3, 6, 7	Fixed Point Monitoring.	Bush Regeneration Contractor	Photographs of fixed monitoring sites to compare the survival and retention of plantings.	Photographs have been taken.	Take photographs.	Every 3 months after the first year of plantings. Every 6 months following the initial year for the life of the VMP.
Zones 1, 3, 5, 6, 7	Carry out secondary weeding.	Bush Regeneration Contractor	Weed regrowth following primary weeding removed. Work has commenced on control of annual weed species.	Weeding of regrowth following primary weeding completed and documented.	Targeted weeding.	Following primary weeding, site visits monthly.
Phase 3 - Maintenance						
Zones 1, 3, 5, 6, 7	Carry out maintenance weeding throughout vegetation zones	Bush Regeneration Contractor	Noxious weeds are less than 2% cover.	Monitoring point 20x20m quadrat data results.	Undertake maintenance weeding.	Monthly for each zone for duration of 5 year maintenance period under VMP.

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Zones 1, 3, 5, 6, 7	Maintenance of plantings.	Bush Regeneration Contractor	Non-noxious weeds are less than 4% cover.	Monitoring point 20x20m quadrat data results.		
			No new weed species or infestations, including the encroachment of exotic lawn/vegetation into area of bush land regeneration.	Monitoring point 20x20m quadrat data results.		
			Survival rate of plantings is 100%.	Monitoring point 20x20m quadrat data results.	Any dead plantings replaced.	Monthly for each zone for duration of 5 year maintenance period under VMP.

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Phase 4 - Monitoring and reporting Zones 1, 3, 5, 6, 7	Biannual inspection of site completed as outlined in Chapter 7	Bush Regeneration Contractor or Ecologist	Species diversity and density equal to or greater than previous monitoring visit.	Monitoring point 20x20m quadrat data results.	Additional plantings where required due to observed gaps in any strata.	
			Plants watered when drought stressed.	Plants are watered during times of drought and documented.	Water plants in times of drought.	During times of drought.
			Survival rate of plantings is 100%.	Monitoring point 20x20m quadrat data results.	Undertake replanting again.	Every 6 months for 5 year maintenance period of VMP.



**Table 8.1**      **Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
			Noxious weeds to be less than 2% cover.	Monitoring point 20x20m quadrat data results.	Targeted weeding.	
			Non-noxious weeds to be less than 4% cover.	Monitoring point 20x20m quadrat data results.	Targeted weeding.	
			Species diversity and density equal to or greater than previous inspection.	Monitoring point 20x20m quadrat data results.	Undertake replanting and/or plant additional species.	
			No encroachment of exotic lawn/vegetation into area of bush land regeneration.	Monitoring point 20x20m quadrat data results.	Targeted weeding and/or installation of physical barrier.	

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
			No erosion or sedimentation into areas of bush land regeneration.	Photographic evidence	Installation of further sediment/erosion controls.	
Zones 1, 3, 5, 6, 7	Progress report preparation.	Bush Regeneration Contractor or Ecologist	Annual Report prepared on progress of restoration works including all data collected in biannual inspections.	Results of data analysis of all data collected in biannual inspections.	Undertake corrective measures including: targeted weeding, replanting or additional species plantings and install additional sediment/erosion controls.	Once a year for the 5 year maintenance period of VMP.

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
Zones 1, 3, 5, 6, 7	Final Inspection of Site carried out at completion of VMP.	Bush Regeneration Contractor or Ecologist	Survival rate of plantings is 100%.	Monitoring point 20x20m quadrat data results.	Extend life of VMP until performance criteria is met.	After 5 years of maintenance under VMP
			Noxious weeds to be less than 2% cover.	Monitoring point 20x20m quadrat data results.	Extend life of VMP until performance criteria is met.	
			Non-noxious weeds to be less than 4% cover.	Monitoring point 20x20m quadrat data results.	Extend life of VMP until performance criteria is met.	
			Species diversity and density equal to or greater than previous inspection.	Monitoring point 20x20m quadrat data results.	Extend life of VMP until performance criteria is met.	

**Table 8.1 Timing and Responsibilities within Management Zones**

Management Zone	Action	Responsibility	Performance Criteria	Performance Measure	Action Required if Performance Criteria is Not Met	Timing
			No encroachment of exotic lawn/vegetation into area of bush land regeneration.	Monitoring point 20x20m quadrat data results.	Extend life of VMP until performance criteria is met.	
Zones 1, 3, 5, 6, 7	Final Report.	Bush Regeneration Contractor or Ecologist	Final report detailing success of restoration or outlining further works needed.	Results of data analysis of all data collected for the life of the VMP.	Extend life of VMP until performance criteria is met.	After 5 years of maintenance under VMP.

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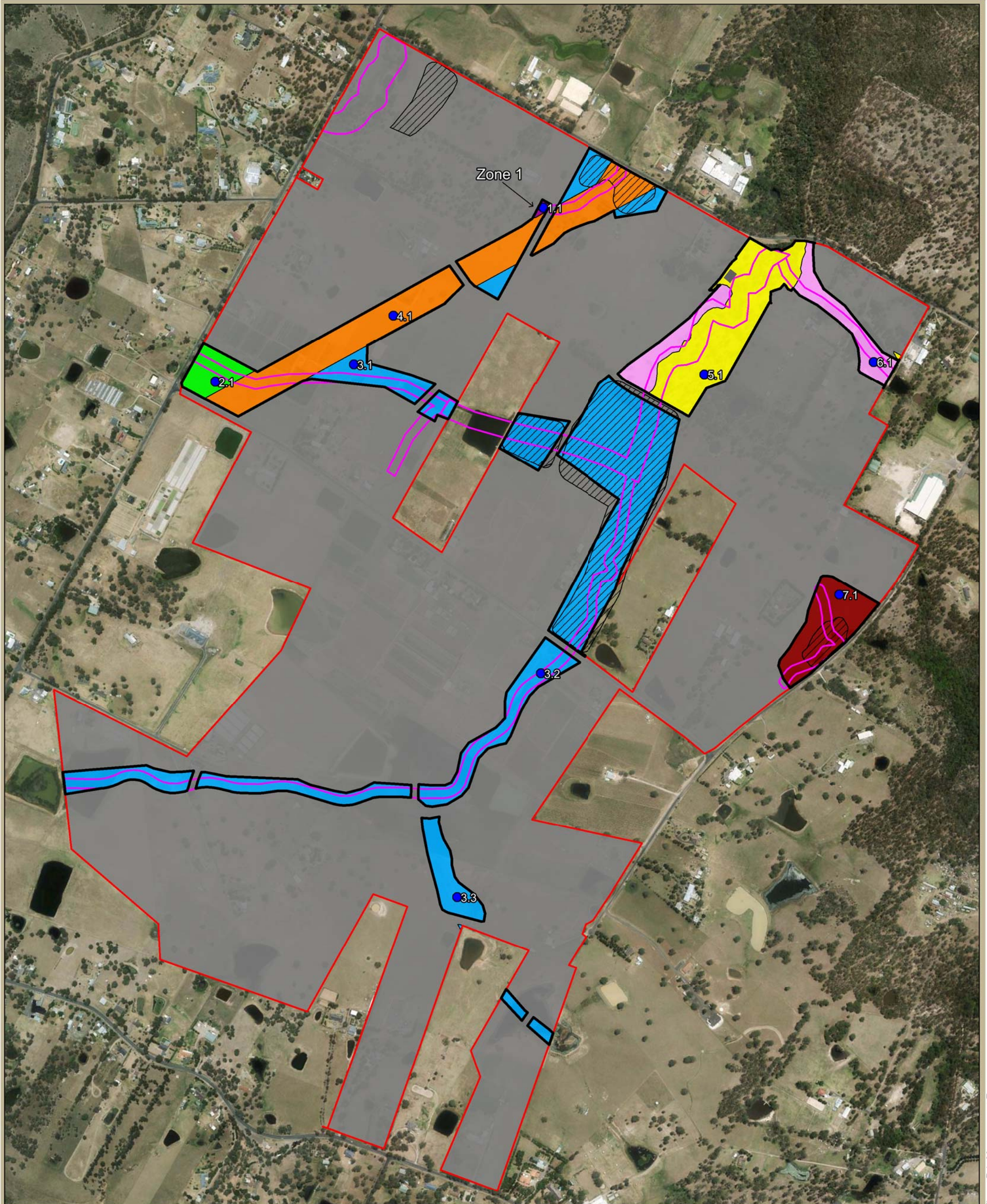
*Appendix A*

Masterplan VMP (Council) Management  
Zones

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- Legend**
- Study Area (Box Hill North)
  - Basin
  - Riparian Corridor
  - Fences
  - Fixed Monitoring Point

- Management Zones**
- |   |   |
|---|---|
| <span style="background-color: purple; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Zone 1 | <span style="background-color: yellow; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Zone 5 |
| <span style="background-color: green; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Zone 2  | <span style="background-color: pink; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Zone 6   |
| <span style="background-color: blue; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Zone 3   | <span style="background-color: red; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Zone 7    |
| <span style="background-color: orange; display: inline-block; width: 20px; height: 10px; margin-right: 5px;"></span> Zone 4 |   |

Image Source:  
Image © 2015 Aerometrex  
(dated 01-01-2014)

cumberland  
ecology

Figure 5.1. Management Zones

150 0 150 300 450 600 m



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*Appendix B*

# Species Planting List

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**Table B.1 Species Planting List – Cumberland Plain Woodland**

Form	Family	Scientific Name	Common Name
Trees	Fabaceae (Mimosoideae)	<i>Acacia parramattensis</i>	Parramatta Wattle
Trees	Myrtaceae	<i>Angophora floribunda</i>	Rough-barked Apple
Trees	Myrtaceae	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
Trees	Myrtaceae	<i>Eucalyptus eugenioides</i>	Narrow-leaved Stringybark
Trees	Myrtaceae	<i>Eucalyptus moluccana</i>	Grey Box
Trees	Myrtaceae	<i>Eucalyptus tereticornis</i>	Forest Red Gum
Trees	Myrtaceae	<i>Melaleuca decora</i>	
Trees	Santalaceae	<i>Exocarpos cupressiformis</i>	Native Cherry
Shrubs	Asteraceae	<i>Ozothamnus diosmifolius</i>	Dogwood
Shrubs	Fabaceae (Mimosoideae)	<i>Acacia falcata</i>	
Shrubs	Fabaceae (Mimosoideae)	<i>Acacia floribunda</i>	White Sally Wattle
Shrubs	Fabaceae (Mimosoideae)	<i>Acacia implexa</i>	Hickory Wattle
Shrubs	Fabaceae (Faboideae)	<i>Bossiaea prostrata</i>	Creeping Bossiaea
Shrubs	Fabaceae (Faboideae)	<i>Chorizema parviflorum</i>	Eastern Flame Pea
Shrubs	Fabaceae (Faboideae)	<i>Daviesia ulicifolia</i>	Gorse Bitter Pea
Shrubs	Fabaceae (Faboideae)	<i>Dillwynia sieberi</i>	
Shrubs	Fabaceae (Faboideae)	<i>Indigofera australis</i>	Australian Indigo
Shrubs	Fabaceae (Faboideae)	<i>Pultenaea microphylla</i>	

**Table B.1 Species Planting List – Cumberland Plain Woodland**

Form	Family	Scientific Name	Common Name
Shrubs	Myrtaceae	<i>Kunzea ambigua</i>	Tick Bush
Shrubs	Phyllanthaceae	<i>Breynia oblongifolia</i>	Coffee Bush
Shrubs	Pittosporaceae	<i>Bursaria spinosa subsp. spinosa</i>	Blackthorn
Shrubs	Rosaceae	<i>Rubus parvifolius</i>	Native Raspberry
Shrubs	Sapindaceae	<i>Dodonaea viscosa</i>	Sticky Hop Bush
Shrubs	Scrophulariaceae	<i>Eremophila debilis</i>	Winter Apple
Forbs (Dicot)	Acanthaceae	<i>Brunoniella australis</i>	Blue Trumpet
Forbs (Dicot)	Apiaceae	<i>Centella asiatica</i>	Indian Pennywort
Forbs (Dicot)	Apiaceae	<i>Daucus glochidiatus</i>	Native Carrot
Forbs (Dicot)	Apiaceae	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
Forbs (Dicot)	Asteraceae	<i>Chrysocephalum apiculatum</i>	Yellow Buttons
Forbs (Dicot)	Asteraceae	<i>Cymbonotus lawsonianus</i>	Bear's Ears
Forbs (Dicot)	Asteraceae	<i>Euchiton sphaericus</i>	
Forbs (Dicot)	Asteraceae	<i>Glossocardia bidens</i>	Cobbler's Tack
Forbs (Dicot)	Asteraceae	<i>Senecio diaschides</i>	
Forbs (Dicot)	Asteraceae	<i>Senecio hispidulus</i>	Hill Fireweed
Forbs (Dicot)	Asteraceae	<i>Senecio linearifolius</i>	Fireweed Groundsel
Forbs (Dicot)	Asteraceae	<i>Sigesbeckia orientalis subsp. orientalis</i>	Indian Weed
Forbs (Dicot)	Asteraceae	<i>Vernonia cinerea</i>	

**Table B.1 Species Planting List – Cumberland Plain Woodland**

Form	Family	Scientific Name	Common Name
Forbs (Dicot)	Campanulaceae	<i>Wahlenbergia gracilis</i>	Small Bluebell
Forbs (Dicot)	Campanulaceae	<i>Wahlenbergia stricta</i> subsp. <i>stricta</i>	Australian Bluebell
Forbs (Dicot)	Chenopodiaceae	<i>Einadia hastata</i>	Berry Saltbush
Forbs (Dicot)	Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush
Forbs (Dicot)	Chenopodiaceae	<i>Einadia polygonoides</i>	
Forbs (Dicot)	Chenopodiaceae	<i>Einadia trigonos</i>	Fishweed
Forbs (Dicot)	Clusiaceae	<i>Hypericum gramineum</i>	Small St Johns Wort
Forbs (Dicot)	Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Forbs (Dicot)	Crassulaceae	<i>Crassula sieberiana</i>	Australian Stonecrop
Forbs (Dicot)	Fabaceae	<i>Desmodium varians</i>	Slender Tick-trefoil
Forbs (Dicot)	Fabaceae	<i>Zornia dyctiocarpa</i> var. <i>Dyctiocarpa</i>	Zornia
Forbs (Dicot)	Geraniaceae	<i>Geranium homeanum</i>	
Forbs (Dicot)	Geraniaceae	<i>Geranium solanderi</i>	Native Geranium
Forbs (Dicot)	Goodeniaceae	<i>Goodenia hederacea</i>	Forest Goodenia
Forbs (Dicot)	Lamiaceae	<i>Ajuga australis</i>	Austral Bugle
Forbs (Dicot)	Lamiaceae	<i>Mentha satureioides</i>	Slender Mint
Forbs (Dicot)	Lamiaceae	<i>Plectranthus parviflorus</i>	Cockspur Flower
Forbs (Dicot)	Lamiaceae	<i>Scutellaria humilis</i>	Dwarf Skullcap
Forbs (Dicot)	Lobeliaceae	<i>Pratia purpurascens</i>	Whiteroot

**Table B.1 Species Planting List – Cumberland Plain Woodland**

Form	Family	Scientific Name	Common Name
Forbs (Dicot)	Malvaceae	<i>Sida corrugata</i>	Corrugated Sida
Forbs (Dicot)	Oxalidaceae	<i>Oxalis perennans</i>	Native oxalis
Forbs (Dicot)	Phyllanthaceae	<i>Phyllanthus virgatus</i>	
Forbs (Dicot)	Phyllanthaceae	<i>Poranthera microphylla</i>	Small-leaved Poranthera
Forbs (Dicot)	Plantaginaceae	<i>Plantago debilis</i>	
Forbs (Dicot)	Plantaginaceae	<i>Plantago gaudichaudii</i>	Narrow Plantain
Forbs (Dicot)	Plantaginaceae	<i>Veronica plebeia</i>	Trailing Speedwell
Forbs (Dicot)	Polygonaceae	<i>Persicaria decipiens</i>	Slender Knotweed
Forbs (Dicot)	Rubiaceae	<i>Asperula conferta</i>	Common Woodruff
Forbs (Dicot)	Rubiaceae	<i>Opercularia diphylla</i>	
Forbs (Dicot)	Solanaceae	<i>Solanum cinereum</i>	
Forbs (Dicot)	Solanaceae	<i>Solanum prinophyllum</i>	Forest Nightshade
Forbs (Dicot)	Stackhousiaceae	<i>Stackhousia viminea</i>	Slender Stackhousia
Forbs (Monocot)	Anthericaceae	<i>Arthropodium milleflorum</i>	Pale Vanilla Lily
Forbs (Monocot)	Anthericaceae	<i>Arthropodium minus</i>	
Forbs (Monocot)	Anthericaceae	<i>Dichopogon fimbriatus</i>	Chocolate Lily
Forbs (Monocot)	Anthericaceae	<i>Dichopogon strictus</i>	Nodding Chocolate Lily
Forbs (Monocot)	Anthericaceae	<i>Tricoryne elatior</i>	Yellow Autumn Lily
Forbs (Monocot)	Colchicaceae	<i>Wurmbea dioica subsp. Dioica</i>	Early Nancy



**Table B.1 Species Planting List – Cumberland Plain Woodland**

Form	Family	Scientific Name	Common Name
Forbs (Monocot)	Commelinaceae	<i>Commelina cyanea</i>	Native Wandering Jew
Forbs (Monocot)	Hypoxidaceae	<i>Hypoxis hygrometrica</i>	Golden Weather-grass
Forbs (Monocot)	Phormiaceae	<i>Dianella longifolia</i>	Blueberry Lily
Grasses	Poaceae	<i>Aristida ramosa</i>	Purple Wiregrass
Grasses	Poaceae	<i>Aristida vagans</i>	Three awned Speargrass
Grasses	Poaceae	<i>Bothriochloa decipiens</i>	Pitted Bluegrass
Grasses	Poaceae	<i>Bothriochloa macra</i>	Red-leg Grass
Grasses	Poaceae	<i>Chloris truncata</i>	
Grasses	Poaceae	<i>Chloris ventricosa</i>	Plump Windmill Grass
Grasses	Poaceae	<i>Cymbopogon refractus</i>	Barbed Wire Grass
Grasses	Poaceae	<i>Dichanthium sericeum</i>	Queensland Bluegrass
Grasses	Poaceae	<i>Dichelachne micrantha</i>	Shorthair Plume Grass
Grasses	Poaceae	<i>Dichelachne parva</i>	Plume Grass
Grasses	Poaceae	<i>Digitaria diffusa</i>	Open Summer-grass
Grasses	Poaceae	<i>Echinopogon caespitosus</i>	Tufted Hedgehog Grass
Grasses	Poaceae	<i>Echinopogon ovatus</i>	Forest Hedgehog Grass
Grasses	Poaceae	<i>Elymus scaber</i>	Common Wheatgrass
Grasses	Poaceae	<i>Eragrostis leptostachya</i>	Paddock lovegrass
Grasses	Poaceae	<i>Eriochloa pseudoacrotricha</i>	Early Spring Grass

**Table B.1 Species Planting List – Cumberland Plain Woodland**

Form	Family	Scientific Name	Common Name
Grasses	Poaceae	<i>Lachnagrostis filiformis</i>	Blown Grass
Grasses	Poaceae	<i>Microlaena stipoides</i>	Weeping Grass
Grasses	Poaceae	<i>Panicum effusum</i>	Hairy Panic
Grasses	Poaceae	<i>Paspalidium distans</i>	
Grasses	Poaceae	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass
Grasses	Poaceae	<i>Rytidosperma racemosa</i> var. <i>Racemosa</i>	Wallaby Grass
Grasses	Poaceae	<i>Rytidosperma tenuius</i>	Wallaby Grass
Grasses	Poaceae	<i>Sorghum leiocladum</i>	Wild Sorghum
Grasses	Poaceae	<i>Sporobolus creber</i>	Slender Rat's Tail Grass
Grasses	Poaceae	<i>Sporobolus elongatus</i>	Slender Rat's Tail Grass
Grasses	Poaceae	<i>Themeda australis</i>	Kangaroo Grass
Sedges and Rushes	Cyperaceae	<i>Carex inversa</i>	
Sedges and Rushes	Cyperaceae	<i>Cyperus gracilis</i>	
Sedges and Rushes	Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge
Sedges and Rushes	Cyperaceae	<i>Scleria mackaviensis</i>	
Sedges and Rushes	Juncaceae	<i>Juncus homalocaulis</i>	
Sedges and Rushes	Juncaceae	<i>Juncus usitatus</i>	
Sedges and Rushes	Lomandraceae	<i>Lomandra filiformis</i>	Wattle Mat-rush
Sedges and Rushes	Lomandraceae	<i>Lomandra multiflora</i>	Many-flowered Mat-rush

**Table B.1 Species Planting List – Cumberland Plain Woodland**

Form	Family	Scientific Name	Common Name
Ferns	Pteridaceae	<i>Cheilanthes distans</i>	Bristly Cloak Fern
Ferns	Pteridaceae	<i>Cheilanthes sieberi</i>	Rock Fern
Vines and Twiners	Fabaceae (Faboideae)	<i>Desmodium brachypodium</i>	Large Tick-trefoil
Vines and Twiners	Fabaceae (Faboideae)	<i>Desmodium varians</i>	Slender Tick-trefoil
Vines and Twiners	Fabaceae (Faboideae)	<i>Glycine clandestina</i>	Twining Glycine
Vines and Twiners	Fabaceae (Faboideae)	<i>Glycine microphylla</i>	Small-leaf Glycine
Vines and Twiners	Fabaceae (Faboideae)	<i>Glycine tabacina</i>	Twining Glycine
Vines and Twiners	Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	Purple Coral Pea
Vines and Twiners	Ranunculaceae	<i>Clematis glycinoides</i>	Headache Vine

**Table B.2 Species Planting List – Shale Sandstone Transition Forest**

Form	Family	Scientific Name	Common Name
Trees	Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-oak
Trees	Casuarinaceae	<i>Allocasuarina torulosa</i>	Forest Oak
Trees	Fabaceae (Mimosoideae)	<i>Acacia parramattensis</i>	Parramatta Wattle
Trees	Myrtaceae	<i>Angophora bakeri</i>	Narrow-leaved Apple
Trees	Myrtaceae	<i>Angophora floribunda</i>	Rough-barked Apple
Trees	Myrtaceae	<i>Angophora subvelutina</i>	Broad-leaved Apple
Trees	Myrtaceae	<i>Corymbia eximia</i>	Yellow Bloodwood
Trees	Myrtaceae	<i>Corymbia gummifera</i>	Red Bloodwood
Trees	Myrtaceae	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
Trees	Myrtaceae	<i>Eucalyptus eugenioides</i>	Narrow-leaved Stringybark
Trees	Myrtaceae	<i>Eucalyptus fibrosa</i>	Broad-leaved Ironbark
Trees	Myrtaceae	<i>Eucalyptus globoidea</i>	White Stringybark
Trees	Myrtaceae	<i>Eucalyptus moluccana</i>	Grey Box
Trees	Myrtaceae	<i>Eucalyptus punctata</i>	Grey Gum
Trees	Myrtaceae	<i>Eucalyptus resinifera</i>	Red Mahogany
Trees	Myrtaceae	<i>Eucalyptus parramattensis subsp. parramattensis</i>	
Trees	Myrtaceae	<i>Eucalyptus sclerophylla</i>	Hard-leaved Scribbly Gum
Trees	Myrtaceae	<i>Eucalyptus sparsifolia</i>	Narrow-leaved Stringybark

**Table B.2 Species Planting List – Shale Sandstone Transition Forest**

Form	Family	Scientific Name	Common Name
Trees	Myrtaceae	<i>Eucalyptus tereticornis</i>	Forest Red Gum
Trees	Santalaceae	<i>Exocarpos cupressiformis</i>	Native Cherry
Trees	Myrtaceae	<i>Melaleuca decora</i>	
Trees	Myrtaceae	<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark
Trees	Proteaceae	<i>Persoonia linearis</i>	Narrow-leaved Geebung
Shrubs	Asteraceae	<i>Ozothamnus diosmifolius</i>	Dogwood
Shrubs	Dilleniaceae	<i>Hibbertia aspera</i>	Rough Guinea Flower
Shrubs	Dilleniaceae	<i>Hibbertia diffusa</i>	Wedge Guinea Flower
Shrubs	Ericaceae (Styphelioideae)	<i>Leucopogon juniperinum</i>	Prickly Beard-heath
Shrubs	Ericaceae (Styphelioideae)	<i>Leucopogon lanceolatus</i>	
Shrubs	Ericaceae (Styphelioideae)	<i>Leucopogon microphyllus</i>	
Shrubs	Ericaceae (Styphelioideae)	<i>Styphelia laeta</i>	Five-corners
Shrubs	Fabaceae (Faboideae)	<i>Bossiaea obcordata</i>	Spiny Bossiaea
Shrubs	Fabaceae (Faboideae)	<i>Bossiaea prostrata</i>	Creeping Bossiaea
Shrubs	Fabaceae (Faboideae)	<i>Daviesia ulicifolia</i>	Gorse Bitter Pea
Shrubs	Fabaceae (Faboideae)	<i>Gompholobium grandiflorum</i>	Large Wedge Pea
Shrubs	Fabaceae (Faboideae)	<i>Indigofera australis</i>	Australian Indigo
Shrubs	Fabaceae (Faboideae)	<i>Pultenaea flexilis</i>	Graceful Bush Pea
Shrubs	Fabaceae (Faboideae)	<i>Pultenaea villosa</i>	Hairy Bush Pea



**Table B.2 Species Planting List – Shale Sandstone Transition Forest**

Form	Family	Scientific Name	Common Name
Shrubs	Fabaceae (Mimosoideae)	<i>Acacia falcata</i>	
Shrubs	Fabaceae (Mimosoideae)	<i>Acacia floribunda</i>	White Sally Wattle
Shrubs	Fabaceae (Mimosoideae)	<i>Acacia parvipinnula</i>	Silver-stemmed Wattle
Shrubs	Myrtaceae	<i>Kunzea ambigua</i>	Tick Bush
Shrubs	Myrtaceae	<i>Leptospermum trinervium</i>	Slender Teatree
Shrubs	Myrtaceae	<i>Melaleuca thymifolia</i>	Thyme Honey-myrtle
Shrubs	Phyllanthaceae	<i>Breynia oblongifolia</i>	Coffee Bush
Shrubs	Phyllanthaceae	<i>Phyllanthus hirtellus</i>	Thyme Spurge
Shrubs	Pittosporaceae	<i>Bursaria spinosa subsp. Spinosa</i>	Blackthorn
Shrubs	Proteaceae	<i>Banksia spinulosa</i>	Hairpin Banksia
Shrubs	Proteaceae	<i>Hakea dactyloides</i>	Finger Hakea
Shrubs	Proteaceae	<i>Hakea sericea</i>	Needle Hakea
Shrubs	Proteaceae	<i>Grevillea mucronulata</i>	
Shrubs	Proteaceae	<i>Lomatia silaifolia</i>	Crinkle Bush
Shrubs	Rhamnaceae	<i>Cryptandra amara</i>	Bitter Cryptandra
Shrubs	Rosaceae	<i>Rubus parvifolius</i>	Native Raspberry
Shrubs	Rubiaceae	<i>Pomax umbellata</i>	
Shrubs	Santalaceae	<i>Exocarpos strictus</i>	Dwarf Cherry
Shrubs	Sapindaceae	<i>Dodonaea triquetra</i>	Hop Bush

**Table B.2 Species Planting List – Shale Sandstone Transition Forest**

Form	Family	Scientific Name	Common Name
Shrubs	Scrophulariaceae	<i>Eremophila debilis</i>	Winter Apple
Forbs (Dicot)	Apiaceae	<i>Centella asiatica</i>	Indian Pennywort
Forbs (Dicot)	Apiaceae	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
Forbs (Dicot)	Asteraceae	<i>Calotis cuneifolia</i>	Purple Burr Daisy
Forbs (Dicot)	Asteraceae	<i>Euchiton sphaericus</i>	
Forbs (Dicot)	Asteraceae	<i>Senecio linearifolius</i>	Fireweed Groundsel
Forbs (Dicot)	Asteraceae	<i>Sigesbeckia orientalis subsp. orientalis</i>	Indian Weed
Forbs (Dicot)	Asteraceae	<i>Vernonia cinerea</i>	
Forbs (Dicot)	Asteraceae	<i>Xerochrysum bracteatum</i>	Golden Everlasting
Forbs (Dicot)	Campanulaceae	<i>Wahlenbergia gracilis</i>	Small Bluebell
Forbs (Dicot)	Chenopodiaceae	<i>Einadia hastata</i>	Berry Saltbush
Forbs (Dicot)	Chenopodiaceae	<i>Einadia trigonos</i>	Fish Weed
Forbs (Dicot)	Clusiaceae	<i>Hypericum gramineum</i>	Small St Johns Wort
Forbs (Dicot)	Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Forbs (Dicot)	Fabaceae	<i>Desmodium varians</i>	Slender Tick-trefoil
Forbs (Dicot)	Geraniaceae	<i>Geranium solanderi</i>	Native Geranium
Forbs (Dicot)	Goodeniaceae	<i>Goodenia hederacea</i>	Forest Goodenia
Forbs (Dicot)	Haloragaceae	<i>Gonocarpus tetragynus</i>	Raspwort
Forbs (Dicot)	Haloragaceae	<i>Gonocarpus teucrioides</i>	Raspwort

**Table B.2 Species Planting List – Shale Sandstone Transition Forest**

Form	Family	Scientific Name	Common Name
Forbs (Dicot)	Lobeliaceae	<i>Pratia purpurascens</i>	Whiteroot
Forbs (Dicot)	Oxalidaceae	<i>Oxalis perennans</i>	Native oxalis
Forbs (Dicot)	Phyllanthaceae	<i>Poranthera microphylla</i>	Small-leaved Poranthera
Forbs (Dicot)	Rubiaceae	<i>Asperula conferta</i>	Common Woodruff
Forbs (Dicot)	Solanaceae	<i>Solanum prinophyllum</i>	Forest Nightshade
Forbs (Dicot)	Stackhousiaceae	<i>Stackhousia muricata</i>	Western Stackhousia
Forbs (Dicot)	Violaceae	<i>Viola hederacea</i>	Ivy-leaved Violet
Forbs (Monocot)	Anthericaceae	<i>Arthropodium milleflorum</i>	Pale Vanilla Lily
Forbs (Monocot)	Commelinaceae	<i>Commelina cyanea</i>	Scurvy Weed
Forbs (Monocot)	Lomandraceae	<i>Lomandra filiformis</i>	Wattle Mat-rush
Forbs (Monocot)	Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
Forbs (Monocot)	Lomandraceae	<i>Lomandra multiflora</i>	Many-flowered Mat-rush
Forbs (Monocot)	Phormiaceae	<i>Dianella longifolia</i>	Blueberry Lily
Forbs (Monocot)	Phormiaceae	<i>Dianella prunina</i>	
Grasses	Poaceae	<i>Aristida vagans</i>	Three awned Speargrass
Grasses	Poaceae	<i>Chloris ventricosa</i>	Plump Windmill Grass
Grasses	Poaceae	<i>Cymbopogon refractus</i>	Barbed Wire Grass
Grasses	Poaceae	<i>Dichelachne micrantha</i>	Plume Grass
Grasses	Poaceae	<i>Echinopogon caespitosus</i>	Tufted Hedgehog Grass

**Table B.2 Species Planting List – Shale Sandstone Transition Forest**

Form	Family	Scientific Name	Common Name
Grasses	Poaceae	<i>Echinopogon ovatus</i>	Forest Hedgehog Grass
Grasses	Poaceae	<i>Elymus scaber</i>	Common Wheatgrass
Grasses	Poaceae	<i>Entolasia marginata</i>	Bordered Panic
Grasses	Poaceae	<i>Entolasia stricta</i>	Wiry Panic
Grasses	Poaceae	<i>Eragrostis brownii</i>	Brown's Lovegrass
Grasses	Poaceae	<i>Microlaena stipoides</i>	Weeping Grass
Grasses	Poaceae	<i>Panicum simile</i>	Two-colour Panic
Grasses	Poaceae	<i>Rytidosperma tenuius</i>	Wallaby grass
Grasses	Poaceae	<i>Sporobolus creber</i>	Slender Rat's Tail Grass
Grasses	Poaceae	<i>Themeda australis</i>	Kangaroo Grass
Sedges and Rushes	Cyperaceae	<i>Cyperus difformis</i>	Dirty Dora
Sedges and Rushes	Cyperaceae	<i>Gahnia aspera</i>	Rough Saw-sedge
Sedges and Rushes	Cyperaceae	<i>Lepidosperma laterale</i>	
Sedges and Rushes	Juncaceae	<i>Juncus usitatus</i>	
Sedges and Rushes	Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
Sedges and Rushes	Lomandraceae	<i>Lomandra multiflora</i>	Many-flowered Mat-rush
Ferns	Adiantaceae	<i>Adiantum aethiopicum</i>	Common Maidenhair
Ferns	Aspleniaceae	<i>Asplenium flabellifolium</i>	Necklace Fern
Ferns	Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken Fern

**Table B.2 Species Planting List – Shale Sandstone Transition Forest**

Form	Family	Scientific Name	Common Name
Ferns	Pteridaceae	<i>Cheilanthes sieberi</i>	Rock Fern
Vines and Twiners	Fabaceae (Faboideae)	<i>Glycine clandestina</i>	Twining Glycine
Vines and Twiners	Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	Purple Coral Pea
Vines and Twiners	Luzuriagaceae	<i>Eustrephus latifolius</i>	Wombat Berry
Vines and Twiners	Ranunculaceae	<i>Clematis aristata</i>	Old Man's Beard
Vines and Twiners	Ranunculaceae	<i>Clematis glycinoides</i>	Headache Vine



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*Appendix C*

# Weed Control Methods

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**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
Acanthaceae	<i>Thunbergia alata</i>	Black-eyed Susan		- Hand Weed - Spot Spray - Glyphosate 10mL/1L
Amaranthaceae	<i>Amaranthus caudatus</i>	Love Lies Bleeding		
Asteraceae	<i>Aster subulatus</i>	Wild Aster		
Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs		
Asteraceae	<i>Arctotheca calendula</i>	Cape Weed		
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle		
Asteraceae	<i>Conyza bonariensis</i>	Flaxleaf Fleabane		
Asteraceae	<i>Conyza sumatrensis</i>	Tall Fleabane		
Asteraceae	<i>Gnaphalium sp.</i>	A Cudweed		
Asteraceae	<i>Hypochaeris microcephala</i>	White Flatweed		
Asteraceae	<i>Hypochaeris radicata</i>	Catsear		
Asteraceae	<i>Lactuca serriola</i>	Prickly Lettuce		
Asteraceae	<i>Senecio madagascariensis</i>	Fireweed	#	
Asteraceae	<i>Soliva sessilis</i>	Bindyi		
Asteraceae	<i>Sonchus oleraceus</i>	Milk Thistle		
Asteraceae	<i>Taraxacum officinale</i>	Dandelion		
Asteraceae	<i>Tagetes minuta</i>	Stinking Roger		

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
Asteraceae	<i>Xanthium occidentale</i>	Noogoora Burr		
Boraginaceae	<i>Echium plantagineum</i>	Paterson's Curse		
Brassicaceae	<i>Cardamine hirsuta</i>	Common Bittercress		
Brassicaceae	<i>Lepidium africanum</i>			
Caryophyllaceae	<i>Cerastium glomeratum</i>	Mouse-ear Chickweed		
Caryophyllaceae	<i>Paronychia brasiliensis</i>	Chilean Whitlow Wort		
Caryophyllaceae	<i>Petrorhagia nanteuilii</i>	Chiding Pink		
Caryophyllaceae	<i>Silene gallica</i> var. <i>gallica</i>			
Caryophyllaceae	<i>Stellaria media</i>	Common Chickweed		
Cyperaceae	<i>Cyperus eragrostis</i>	Umbrella Sedge		
Cyperaceae	<i>Cyperus sesquiflorus</i>	Fragrant Kyllingia		
Cyperaceae	<i>Isolepis levynsiana</i>	Tiny Flat Sedge		
Fabaceae (Faboideae)	<i>Lotus uliginosus</i>	Greater Bird's Foot Trefoil		
Fabaceae (Faboideae)	<i>Medicago minima</i>	Woolly Burr Medic		
Fabaceae (Faboideae)	<i>Medicago polymorpha</i>	Burr Medic		
Fabaceae (Faboideae)	<i>Trifolium dubium</i>	Yellow Suckling Clover		

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
Fabaceae (Faboideae)	<i>Trifolium repens</i>	White Clover		
Fabaceae (Faboideae)	<i>Vicia hirsuta</i>	Tiny Vetch		
Fabaceae (Faboideae)	<i>Vicia sativa</i>	Common Vetch		
Iridaceae	<i>Sisyrinchium iridifolium</i>	Blue Pigroot		
Malvaceae	<i>Malva parviflora</i>	Small Flowered Mallow		
Malvaceae	<i>Modiola caroliniana</i>	Red-flowered Mallow		
Myrsinaceae	<i>Anagallis arvensis</i>	Scarlet Pimpernel		
Oxalidaceae	<i>Oxalis corniculata</i>	Yellow Wood Sorrel		
Phytolaccaceae	<i>Phytolacca octandra</i>	Inkweed		
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues		
Plantaginaceae	<i>Veronica arvensis</i>	Wall Speedwell		
Poaceae	<i>Andropogon virginicus</i>	Whisky Grass		
Poaceae	<i>Axonopus fissifolius</i>	Carpet Grass		
Poaceae	<i>Bromus catharticus</i>	Brome Grass		
Poaceae	<i>Briza maxima</i>	Quaking Grass		
Poaceae	<i>Briza subaristata</i>	Chilean Quaking Grass		
Poaceae	<i>Dactylis glomerata</i>	Orchard Grass		

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
Poaceae	<i>Echinochloa crus-galli</i>	Barnyard Grass		
Poaceae	<i>Ehrharta erecta</i>	Panic Veldtgrass		
Poaceae	<i>Eleusine indica</i>	Crow's Foot		
Poaceae	<i>Eragrostis cilianensis</i>	Stinkgrass		
Poaceae	<i>Holcus lanatus</i>	Yorkshire Fog		
Poaceae	<i>Lolium perenne</i>	Perennial Ryegrass		
Poaceae	<i>Paspalum dilatatum</i>	Dallis grass		
Poaceae	<i>Paspalum urvillei</i>	Vasey Grass		
Poaceae	<i>Pennisetum clandestinum</i>	Kikuyu Grass		
Poaceae	<i>Poa annua</i>	Winter Grass		
Poaceae	<i>Setaria parviflora</i>	Pigeon Grass		
Poaceae	<i>Sporobolus africanus</i>	Parramatta Grass		
Poaceae	<i>Stenotaphrum secundatum</i>	Buffalo Grass		
Polygonaceae	<i>Persicaria capitata</i>	Japanese Knotweed		
Polygonaceae	<i>Rumex crispus</i>	Curled Dock		
Rubiaceae	<i>Richardia stellaris</i>			
Scrophulariaceae	<i>Verbascum virgatum</i>	Twiggy Mullein		

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
Solanaceae	<i>Solanum americanum</i>	Glossy Nightshade		
Solanaceae	<i>Solanum linnaeanum</i>	Apple of Sodom		
Solanaceae	<i>Solanum nigrum</i>	Blackberry Nightshade		
Solanaceae	<i>Solanum pseudocapsicum</i>	Jerusalem Cherry		
Solanaceae	<i>Solanum sisymbriifolium</i>	Sticky Nightshade		
Verbenaceae	<i>Verbena bonariensis</i>	Purple Top		
Verbenaceae	<i>Verbena rigida</i> var. <i>rigida</i>	Veined Verbena		
Amaranthaceae	<i>Alternanthera pungens</i>	Khaki Weed		<ul style="list-style-type: none"> <li>- Dig deep tap root out with hand tools - Care must be taken to bag and remove all vegetative material from the plant as it will regrow from fragments</li> <li>- Spot spray plant before flowering with Glyphosate 10mL/1L</li> </ul>
Apiaceae	<i>Foeniculum vulgare</i>	Fennel		<ul style="list-style-type: none"> <li>- Hand weed or spot spray juveniles with Glyphosate 15mL/L or metsulfuron methyl 7 g/100 L + non-ionic surfactant</li> <li>- Tall, mature individuals can be removed with a mattock, with care taken to sever the tap root as deep below ground as possible</li> <li>- Spot spray mature individuals and regrowth with Glyphosate 15mL/L or metsulfuron methyl 7 g/100 L + non-ionic surfactant - Care needs to be taken to prevent damage to native vegetation when spraying tall individuals</li> </ul>
Apiaceae	<i>Hydrocotyle bonariensis</i>	Pennywort		<ul style="list-style-type: none"> <li>- Mechanical - Using a shovel or mattock dig up underground rhizomes - Extremely time consuming and impractical</li> <li>- Use a wick/wand to apply undiluted Glyphosate to leaf surface</li> </ul>



**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
Apocynaceae	<i>Araujia sericifera</i>	Moth Vine		<ul style="list-style-type: none"> <li>- Hand Weed Juveniles</li> <li>- Spray juveniles with Glyphosate 10mL/1L</li> <li>- Skirt mature vines (cut through plant close to root) and then pull root manually or apply undiluted Glyphosate to cut surface</li> <li>- Scrape and paint vine with undiluted Glyphosate</li> </ul>
Apocynaceae	<i>Gomphocarpus fruticosus</i>	Narrow-leaved Cotton Bush		<ul style="list-style-type: none"> <li>- Hand Weed Juveniles</li> <li>- Spot Spray Glyphosate 15mL/1L</li> <li>- Cut and Paint Glyphosate 50mL/100mL</li> </ul>
Asparagaceae	<i>Asparagus aethiopicus</i>	Sprenger's Asparagus	#	<ul style="list-style-type: none"> <li>- Any branches profuse with fruit should be cut with secateurs and bagged to prevent further spread of species by birds</li> <li>- Juvenile plants can be eased out of soil with a trowel or knife - care should be taken to remove below ground plant material</li> <li>- For large, mature plants the woody crown at the base can be cut around with a sharp knife, or hacked out with a mattock or peter lever and removed - it is easiest to cut all branches off near the base with secateurs prior to removing crown - plant will not resprout from water storing tubers or roots below ground so these can be left to rot to reduce soil disturbance.</li> <li>- Spray mature and juvenile plants with metsulfuron methyl 6g/100mL + surfactant</li> </ul>
Asparagaceae	<i>Asparagus asparagoides</i>	Bridal Creeper	#	<ul style="list-style-type: none"> <li>- Dig out with hand tools - Care needs to be taken to remove all tuberous masses and rhizomes. Tuberous masses need soil excavation around and careful levering with hand tools to remove without leaving plant material behind to resprout.</li> <li>- July-September - Spray foliage with Glyphosate 10mL/1L + surfactant</li> <li>- May to June - Spray foliage with metsulfuron methyl (e.g. Brush Off) 5g/100L + non-</li> </ul>

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
				ionic surfactant
Asparagaceae	<i>Asparagus officinalis</i>	Asparagus		<ul style="list-style-type: none"> <li>- Remove with secateurs and bag and reproductive material</li> <li>- Plant can be dug out of ground with hand tools, however care needs to be taken to completely remove crown from base of plant as it will resprout</li> <li>- Foliar spray with 10mL/1L Glyphosate can be effective for large infestations however regrowth will need to be resprayed over a number of months upon resprouting from crown</li> </ul>
Asteraceae	<i>Ageratina adenophora</i>	Crofton Weed		<ul style="list-style-type: none"> <li>- Hand Weed</li> <li>- Spot Spray with Glyphosate 5mL/1L</li> <li>- Slash large individuals with brushcutter and spray regrowth foliage with Glyphosate 5mL/1L</li> </ul>
Asteraceae	<i>Ageratina riparia</i>	Crofton Mistflower		<ul style="list-style-type: none"> <li>- Hand Weed</li> <li>- Spot Spray with Glyphosate 5mL/1L</li> <li>- Slash large individuals with brushcutter and spray regrowth foliage with Glyphosate 5mL/1L</li> </ul>
Asteraceae	<i>Delairea odorata</i>	Cape Ivy		<ul style="list-style-type: none"> <li>- Hand weed taking care to bag and remove all stem pieces</li> <li>- Spray with Glyphosate 10mL/1L (spraying of regrowth may be necessary in following site visits)</li> <li>- Cut stem aerial stems at 1m height and hand remove remaining rooted plant parts of treat cut surface with undiluted Glyphosate</li> </ul>
Bignoniaceae	<i>Tecoma capensis</i>	Cape Honeysuckle		<ul style="list-style-type: none"> <li>- Spray juveniles with Glyphosate 10mL/1L</li> <li>- Cut mature individuals with loppers near ground level and paint stump with undiluted Glyphosate</li> </ul>

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
				- Spray foliage of mature and regrowth individuals with Glyphosate 10mL/1L
Cactaceae	<i>Opuntia stricta</i>	Common Prickly Pear	#	<ul style="list-style-type: none"> <li>- This weed is difficult to treat with chemicals, and chemicals such as arsenic that do kill the plant are highly toxic to other plants and animals so should not be used in bushland</li> <li>- Due to the introduction of the Cactoblastis moth in 1926, which preys on the species, mature individuals of the plant occur only sporadically and are easily manually removed</li> <li>- As the plant reproduces vegetatively the entirety of the plant must be bagged and removed from the site, including as much root material as possible. As the plant is soft the above ground areas of the plant are easily cut into pieces with a hand saw, and after removal of the upper areas of the plant the root material should be dug out with a hand mattock.</li> </ul>
Caprifoliaceae	<i>Lonicera japonica</i>	Japanese Honeysuckle		<ul style="list-style-type: none"> <li>- Cut and scrape vine stems with undiluted Glyphosate</li> <li>- Hand weed seedlings</li> <li>- Spray low lying foliage, regrowth foliage, and seedlings with 20mL/1L Glyphosate &amp; metsulfuron methyl(e.g. Brush-Off) 10.5g/10L + non ionic surfactant</li> <li>- Roots of plant can be dug up with mattock or shovel</li> </ul>
Commelinaceae	<i>Tradescantia fluminensis</i>	Wandering Jew		<ul style="list-style-type: none"> <li>- Small infestations can be removed by hand weeding - Care needs to be taken not to leave behind any plant material which will resprout.</li> <li>- Large infestations can be controlled by spraying with Glyphosate 10mL/1L, and the use of a surfactant will increase the efficacy of herbicide. Spraying needs to be repeated during every site visit. It can take several months before the mature plants appear to be affected but a sudden die off will occur after several months of treatment. Any regrowth material following die off of mature plants needs to be sprayed or removed by hand.</li> <li>- Large infestations can be raked up and bagged and removed from site. This is time consuming and labour intensive due to the large mass and weight of heavy infestations</li> </ul>

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
				<p>of healthy plants.</p> <ul style="list-style-type: none"> <li>- Large infestations can be covered with black plastic sheets for several months. The plants will die eventually due to lack of required sunlight. This method is not recommended for bushland regeneration as it also inhibits regrowth form seed of native plant species.</li> </ul>
Convolvulaceae	<i>Ipomoea indica</i>	Morning Glory		<ul style="list-style-type: none"> <li>- Hand pull taking care to remove root system and stem - plant will resprout from stem segments not removed from site</li> <li>- Cut vine at 1m or less above ground height and pull remaining plant out of the ground at the roots</li> <li>- Spray any ground hugging vines with Glyphosate 10mL/1L (will require follow up spraying of regrowth over several months as plant will resprout)</li> </ul>
Cyperaceae	<i>Cyperus rotundus</i>	Nut Grass		<ul style="list-style-type: none"> <li>- Difficult Weed to control manually as it an has extensive underground root network with tubers from which it will resprout - if manual methods need entirety of underground mass needs to be dug up, bagged, and removed from site</li> <li>- Weed is resistant to most herbicides which will kill foliage though not tubers from which it will resprout</li> <li>- Use of Glyphosate 10 mL/1L will kill tubers eventually if foliage and resprouting foliage is sprayed repeatedly during each site visit - Spraying should occur monthly until no resprouting material is present, and area should be monitored following this for new foliage in the months after</li> </ul>
Fabaceae (Caesalpinioideae)	<i>Senna pendula</i> var. <i>glabrata</i>			<ul style="list-style-type: none"> <li>- Hand weed juveniles</li> <li>- Spray juvenile individuals with Glyphosate 10mL/1L</li> <li>- Cut and paint mature individuals with undiluted Glyphosate</li> </ul>

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
Fabaceae (Mimosoideae)	<i>Acacia saligna</i>	Golden Wreath Wattle		<ul style="list-style-type: none"> <li>- Hand weed juveniles</li> <li>- Cut mature plants as close as possible to the ground with loppers or a saw and apply undiluted Glyphosate to the stump</li> </ul>
Iridaceae	<i>Gladiolus undulatus</i>	Wild Gladiolus		<ul style="list-style-type: none"> <li>- Dig out with hand tools - Care needs to be taken to removal all small cormels present under the main corm - May require bagging and removal of soil around the main corm to remove all cormels</li> <li>- Spray regrowth seedlings with Glyphosate 10mL/1L</li> </ul>
Iridaceae	<i>Romulus rosea</i>	Onion Grass		<ul style="list-style-type: none"> <li>- Hand weed - Corms beneath the plant must be removed from the soil to prevent resprouting - This can be done by digging down to the corm with a knife or trowel and carefully levering the corm out of the soil</li> <li>- Foliar spraying of the plant with Glyphosate 10 mL/1L plus non-ionic surfactant at 2mL/1L water or metsulfuron methyl (600g/kg) at 0.14g/L water plus 1ml/1L non-ionic surfactant is effective, though in order to kill corms spraying should take place when plants are 6-8 weeks old after emerging from the soil surface, when the old corm is exhausted and a new corm is developing</li> </ul>
Liliaceae	<i>Lilium formosanum</i>	Formosan Lily		<ul style="list-style-type: none"> <li>- Cut, bag, and remove any mature seed heads from site</li> <li>- Dig out with hand tools - Care must be taken to remove bulb and all bulbils from base of plant below soil surface</li> <li>- Dense infestations can be sprayed with Glyphosate 10mL/1L however follow up hand weeding will be needed to dig up bulbs and bulbils of resprouting plants</li> </ul>
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne		<ul style="list-style-type: none"> <li>- Hand weed</li> <li>- Spray with Glyphosate 10mL/1L</li> <li>- Cut large, firmly rooted individuals at the base with secateurs and paint with undiluted</li> </ul>

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
				Glyphosate
Meliaceae	<i>Melia azedarach</i>	White Cedar		<ul style="list-style-type: none"> <li>- Native species that is considered a weed outside of rainforest areas. The leaves and fruit are toxic and caution should be used when handling the plant (dust mask and gloves when sawing)</li> <li>- Hand weed juveniles</li> <li>- Drill holes with power drill with thick drill bit into mature trees, around base of trunk and fill holes with undiluted Glyphosate. Once Glyphosate has been absorbed refill holes with undiluted Glyphosate several times.</li> <li>- Cut shrub and mature individuals as close to ground as possible with loppers or hand saw (or chainsaw) and treat stump with undiluted Glyphosate</li> <li>- Spray juveniles and regrowth foliage of cut and painted individuals with Glyphosate 10mL/1L</li> </ul>
Ochnaceae	<i>Ochna serrulata</i>	Mickey Mouse Bush		<ul style="list-style-type: none"> <li>- Stems of all juvenile and mature plants should be scraped and painted with undiluted Glyphosate - follow up treatment may be needed on regrowth stems around base of plant in following monthly site visits</li> <li>- Mature fruits on plants should be bagged and removed from site</li> </ul>
Oleaceae	<i>Ligustrum sinense and Ligustrum lucidum</i>	Small-leaved Privet and Broad-leaf Privet		<ul style="list-style-type: none"> <li>- Hand weed juveniles</li> <li>- Drill holes with power drill with thick drill bit into mature trees, around base of trunk and fill holes with undiluted Glyphosate. Once Glyphosate has been absorbed refill holes with undiluted Glyphosate several times.</li> <li>- Cut shrub and mature individuals as close to ground as possible with loppers or hand saw and treat stump with undiluted Glyphosate</li> <li>- Spray juveniles and regrowth foliage of cut and painted individuals with Glyphosate 10mL/1L</li> </ul>



**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
Oleaceae	<i>Olea europaea subsp. cuspidata</i>	African Olive		<ul style="list-style-type: none"> <li>- Spray juveniles with Glyphosate 10mL/1L</li> <li>- Cut mature individuals with saw or loppers near ground level and paint stump with undiluted Glyphosate</li> </ul>
Passifloraceae	<i>Passiflora edulis</i>	Passion Fruit		<ul style="list-style-type: none"> <li>- Hand weed Juveniles</li> <li>- Dig roots out of ground for larger individuals or use secateurs to cut the vine near the base and treat cut surface with undiluted Glyphosate</li> </ul>
Passifloraceae	<i>Passiflora subpeltata</i>	White Passion Flower		<ul style="list-style-type: none"> <li>- Hand weed</li> <li>- Scrape stems with knife and paint exposed surface with undiluted Glyphosate</li> <li>- Spray foliage with Glyphosate 10mL/1L plus non-ionic surfactant</li> </ul>
Poaceae	<i>Chloris gayana</i>	Rhodes Grass		<ul style="list-style-type: none"> <li>- Hand weed juveniles</li> <li>- Remove carefully with secateurs and bag seed plumes of mature plants</li> <li>- Dig mature plants out of the ground with a mattock; or</li> <li>- Brushcut mature plants to near ground level and spray with Glyphosate 10mL/1L - During subsequent site visits spray regrowth foliage with Glyphosate 10mL/1L</li> </ul>
Poaceae	<i>Cortaderia selloana</i>	Pampas Grass		<ul style="list-style-type: none"> <li>- Dig out large clumps with mattock</li> <li>- Spot spray with Glyphosate 10mL/1L</li> <li>- Large plants can be mown or brush cut to ground level, then regrowth sprayed with Glyphosate</li> </ul>
Poaceae	<i>Cynodon dactylon</i>	Common Couch		<ul style="list-style-type: none"> <li>- Hand Weed</li> <li>- Spot Spray with Glyphosate 10mL/1L - May require monthly treatment of regrowth individuals for up to six months</li> </ul>
Poaceae	<i>Digitaria sanguinalis</i>	Summer Grass		<ul style="list-style-type: none"> <li>- This species is present above ground generally only during the warmer months of the year when it grows densely, in large abundances, after seedlings germinate from soil</li> </ul>

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
				<p>seed. It seeds profusely and it is important to prevent seed from being deposited in the soil to prevent dense infestations the following year. It is important to control juveniles before they are able to produce and set seed. On any plant that is seeding the seed head needs to be cut off and bagged, with secateurs for individual plants, or use of shears in areas with large amounts of the grass seeding.</p> <p>- The most effective control methods is to spray all patches of juvenile plants with Glyphosate 10mL/1L before they reach maturity. This needs to be repeated during every site visit during the warmer months as germination of new plants will occur throughout this period.</p>
Poaceae	<i>Eragrostis curvula</i>	African Lovegrass		<p>- Dig large individuals out with a mattock</p> <p>- Juvenile individuals can be dug out using hand tools</p> <p>- Spot spraying with Glyphosate 10mL/10L is effective during the growth period during Spring and Summer - During this period large individuals can be mown or brushcut to the ground level and regrowth foliage sprayed with Glyphosate</p>
Poaceae	<i>Hyparrhenia hirta</i>	Coolatai Grass		<p>- Hand weed</p> <p>- Remove using mechanical means, i.e. Mattock</p> <p>- Spray with 10mL/1L Glyphosate three times in one growth season</p>
Poaceae	<i>Phalaris aquatica</i>	Canary Grass		<p>- Spray using 10mL/1L Glyphosate - May need repeat spraying over several months</p> <p>- Hand weed taking care to remove rhizomes</p> <p>- Large plants may be mown or brushcut and regrowth sprayed during following site visits</p>
Polygalaceae	<i>Polygala virgata</i>	Broom Milkwort		<p>- Hand weed seedlings</p> <p>- Spray seedlings with Glyphosate 10mL/1L</p>

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
				- Cut mature plants close to ground with secateurs and treat stump with undiluted Glyphosate
Polygonaceae	<i>Acetosa sagittata</i>	Turkey Rhubarb		<ul style="list-style-type: none"> <li>- Bag and remove seed present on mature plants</li> <li>- Cut vines close to the ground and dig out as much as of root system and tubers as possible</li> <li>- Juvenile plants growing from seed can be dug out or hand pulled - Tuber at base of plant needs to be removed</li> <li>- On individuals with deep and difficult to remove tubers, stems can be scraped on one side with a blade for a length of 45cm and scraped area painted with undiluted Glyphosate - This treatment may need to be repeated on subsequent site visits</li> <li>- On plants with difficult and deep to remove tubers the tubers close to the surface can also be scraped and painted with undiluted Glyphosate</li> </ul>
Polygonaceae	<i>Acetosella vulgaris</i>	Sheep Sorrel		<ul style="list-style-type: none"> <li>- Plant is difficult to control manually due to regrowth and spread from any underground rhizomes not removed. Manual removal of small infestations requires that all underground rhizomes as well as above ground plant material are bagged and removed from site. Insufficient manual removal of rhizomes can lead to larger infestations of the species than to start with.</li> <li>- Species can be controlled with spot spraying of foliage with Glyphosate 10mL/1L, however plants need to be monitored for regrowth and resprayed monthly over at least a six month period.</li> <li>- Any reproductive features of the plant such as seed on mature individuals should be cut off with secateurs, bagged, and removed from site prior to spraying or manual removal</li> </ul>
Proteaceae	<i>Grevillea robusta</i>	Silky Oak		<ul style="list-style-type: none"> <li>- Hand weed juveniles or spot spray with Glyphosate 10mL/1L</li> <li>- Cut mature/shrub individuals with loppers or a saw as close to the ground as possible</li> </ul>

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
				and paint stump with undiluted Glyphosate
Ranunculaceae	<i>Ranunculus repens</i>	Creeping Buttercup		<ul style="list-style-type: none"> <li>- Hand weed - Care must be taken to remove all plant parts including runners to prevent vegetative reproduction</li> <li>- Spot spray with Glyphosate 10mL/1L - follow up treatment may be needed over subsequent visits to treat any regrowth</li> </ul>
Rosaceae	<i>Rubus fruticosus sp. agg.</i>	Blackberry complex	#	<ul style="list-style-type: none"> <li>- It is possible to spray with 10mL/1L Glyphosate however it will leave dangerous thorned stems</li> <li>- Wearing thick clothing and leather glove uses loppers to cut close to base and apply undiluted Glyphosate to cut stems (remove cut foliage and stems cautiously)</li> <li>- Spray regrowth foliage with Glyphosate 10mL/1L</li> </ul>
Rutaceae	<i>Murraya paniculata</i>	Orange Jessamine		<ul style="list-style-type: none"> <li>- Hand weed juveniles or spray with 10mL/1L Glyphosate</li> <li>- Cut mature plants close to the ground with a hand saw and apply undiluted Glyphosate to cut stump surface</li> <li>- Spray any regrowth foliage from cut stumps with Glyphosate 10mL/1L</li> </ul>
Sapindaceae	<i>Cardiospermum grandiflorum</i>	Balloon Vine		<ul style="list-style-type: none"> <li>- Hand weed juveniles or spray with Glyphosate 10mL/1L</li> <li>- Hand pull roots of mature vines</li> <li>- Vines growing over trees, shrubs, or other objects should be skirted with shears as close to the ground as possible - Spray remaining ground coverage with Glyphosate 10mL/1L, or treat cut stems with undiluted Glyphosate</li> <li>- Bag and remove seed cases where possible</li> </ul>
Solanaceae	<i>Cestrum parqui</i>	Green Cestrum		<ul style="list-style-type: none"> <li>- Hand weed juveniles</li> <li>- Scrape stem and paint with undiluted Glyphosate</li> <li>- Cut all above ground suckering individuals with loppers or saw and paint stumps with</li> </ul>

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
				undiluted Glyphosate - Spray regrowth foliage with Glyphosate 10mL/1L
Solanaceae	<i>Lycium ferocissimum</i>	African Boxthorn	#	- Heavy PPE such as leather gloves, and caution should be used when working with this plant due to the presence of large thorns - Juvenile individuals can be hand weeded - Mature individuals should be cut at the base with a hand saw and undiluted Glyphosate painted on to the cut stump surface - Alternatively for large individuals a power drill can be used to drill holes 5 cm apart which should be filled with undiluted Glyphosate
Solanaceae	<i>Solanum mauritianum</i>	Wild Tobacco Bush		- When working with this plant additional PPE may be required as some individuals are sensitive to the shedding fine hairs of the species - Recommended PPE is a dust mask, long sleeve shirt and pants + gloves - Hand weed juveniles - Mature individuals can be cut and painted with Glyphosate 10mL/1L
Verbenaceae	<i>Lantana camara</i>	Lantana	#	- Hand weed juveniles and regrowth from small pieces - Spot spray with Glyphosate 10mL/1L - Slash using brushcutter, or hand cut with loppers, and spray regrowth foliage with Glyphosate 10mL/1L - Cut near ground level and paint with undiluted Glyphosate - Some individuals will have stumps which will still regrow foliage, spray regrowth foliage with Glyphosate 10mL/1L
Zingiberaceae	<i>Hedychium gardnerianum</i>	Ginger Lily		- Cut, bag, and remove mature seed heads from plants - Dig up with mattock or hand pull mature plants, taking care to remove all fleshy

**Table C.1 Weed Control Methods**

Family	Species	Common Name	Status	Treatment Methods
				<p>rhizomes</p> <ul style="list-style-type: none"> <li>- Rhizomes need to be removed from site, or crushed and piled on site to rot (monitor for regrowth)</li> <li>- Cut plant as close to rhizome as possible and treat with undiluted metsulfuron methyl at 6g -1 L (winter) or 1g -1 L (summer)</li> </ul>

# Denotes Weeds of National Significance/State Priority Weed