Appendix 4: VMP (Biosis 2017c)

Lot 101 DP 785139 Crest Road, Albion Park: Vegetation Management Plan

FINAL REPORT Version 3

Prepared for MMJ Real Estate on behalf of Spinitu Pty Ltd

13 April 2017

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- Lauren Harley and Ashleigh Pritchard (mapping)
- Stefan Rose for (quality assurance)

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Glossary

APZ	Asset Protection Zone (Bushfire)
DBH	Diameter at Breast Height
DoE	Department of the Environment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
HBT	Hollow Bearing Tree
KTP	Key Threatening Process
LEP	Local Environment Plan
NSW	New South Wales
NV Act	*Native Vegetation Act 2003*
NW Act	*Noxious Weed Act 1993*
OEH	NSW Office of Environment and Heritage
TSC Act	*Threatened Species Conservation Act 1995*
Council	Shellharbour City Council

1. Introduction

1.1 Project background

Biosis Pty Ltd has been engaged by MMJ Real Estate (MMJ) on behalf of Spinitu Pty Ltd, to prepare a Vegetation Management Plan (VMP) for Lot 101 DP 785139 Crest Road, Albion Park (Figure 1). As a part of the residential subdivision of land an area zoned 'E3 Environmental Management', under the Shellharbour City Council LEP (2013) will be retained as an 'Environmental Management Area' and managed for conservation purposes. This VMP addresses requirements for restoration and on-going management of the Environmental Management Area.

Under Section 20.2 of Shellharbour City Council DCP - Remnant vegetation and wetlands, the Environmental Management Area requires a VMP to include the following:

- Methods of weed removal and control – all exotic vegetation should be removed.
- Revegetation – include plant species, location, methods for planting, site preparation and site stabilisation.
- Site and vegetation maintenance requirements including the establishment phase and longer term requirements.
- Aquatic and semi-aquatic plant species including location and planting density.
- Staging and sequence details for revegetation and maintenance tasks.
- A monitoring and performance evaluation program and to include replacement species.

Additional to these requirements Council has requested nest boxes be installed within the Environmental Management Area at an offset of 1:1 for loss from the development site. The management requirements for nest boxes are detailed within this plan.

1.2 Scope of Vegetation Management Plan

The VMP addresses the management of vegetation, as per the requirements set out within the Shellharbour DCP for Environmental Land, for the Environmental Management Area shown in Figure 2. The objectives of the VMP are to:

- Provide a management plan to address the ecological values of the property and identify specific management actions for any flora or fauna habitat within retained Environmental Management Area.
- Identify vegetation management zones, as well as significant native flora species, fauna habitat and weed species present within the VMP's maps.
- Define native trees to be retained and provide measures to ensure the protection of retained trees, if required, during the construction phase of the project.
- Detail management objectives, actions and performance measures for each management zone.
- Provide nest box replacement details and management requirements.
- Provide a program of works with specific timeframes detailing actions required within each management zone and performance evaluation criteria.

- Provide specifications for the revegetation of areas where retained vegetation is in poor condition.
- Provide on-going weed management actions for five years to guide maintenance of primary restoration works and ensure the ecological values of native vegetation within the Environmental Management Area are maintained.
- Provide a brief monitoring program based on the objectives, actions and performance measures for each management zone.

1.3 Environmental Management Area

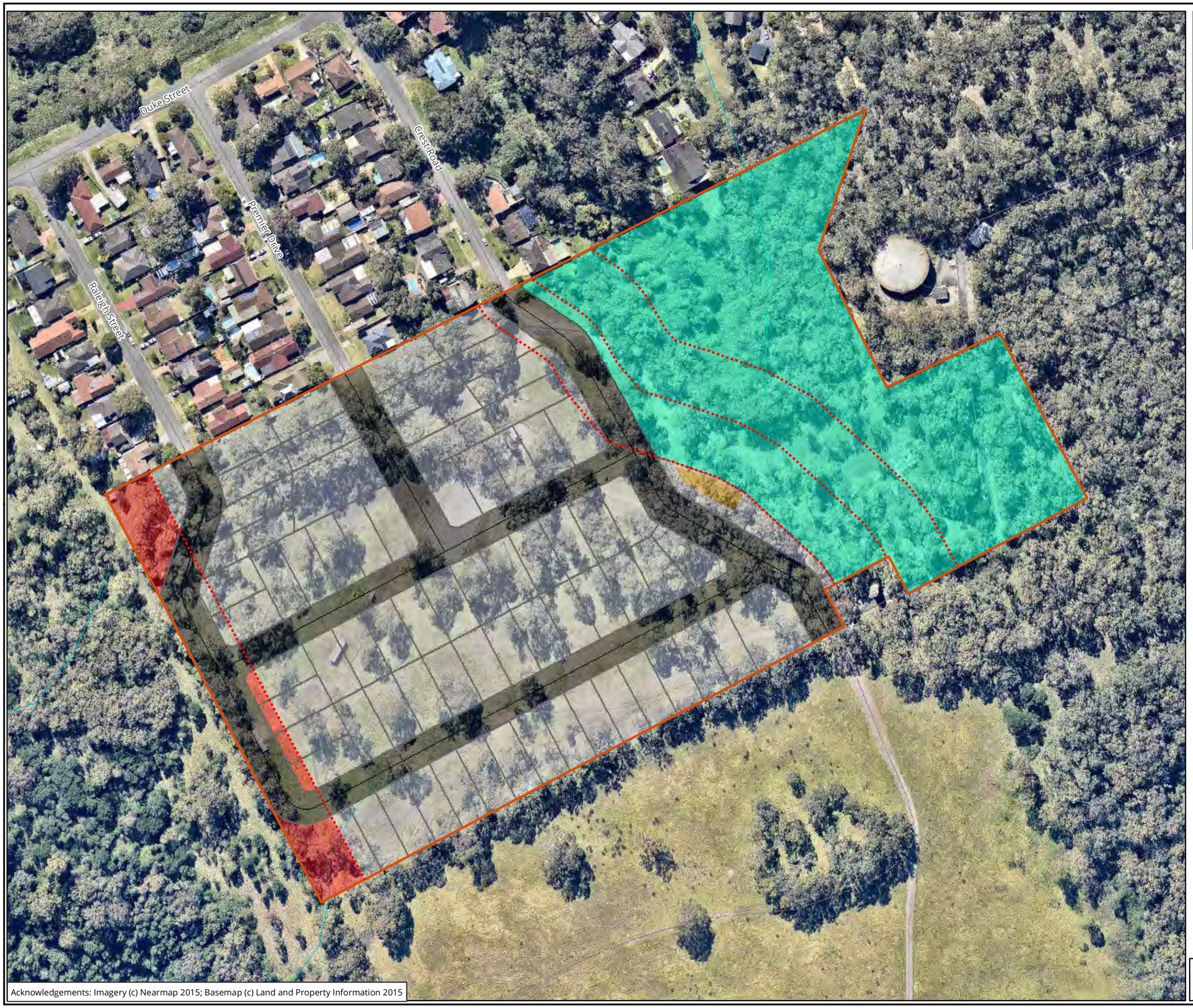
The Environmental Management Area site is located at Albion Park in the Shellharbour LGA (Figure 1) and encompasses a parcel of land approximately 2.71 hectares in area at Crest Rd, Albion Park. The Environmental Management Area is underlain by both the Bombo Soils Landscape and Albion Park Soils Landscape. The former is found in steeper areas of the Environmental Management Area, with the Albion Park Soils landscape occurring as the terrain flattens on the hill crest down to the southern and western boundaries of the site (Hazleton & Tille 1990). Erosion hazard for steeper slopes on Bombo soils landscapes is considered moderate to high for concentrated and non-concentrated flows is moderate to high (Hazleton & Tille 1990). The north-eastern section of the Environmental Management Area is located on steep slopes, sloping down towards the gully.

The Environmental Management Area falls within the:

- Illawarra Subregion of the Sydney Basin Bioregion;
- Lake Illawarra catchment;
- Southern Rivers Catchment Management Authority area; and
- Shellharbour LGA.

1.4 Proposed Works

An Environmental Management Area will be created to the east of the proposed residential subdivision within the parcel of land, Lot 101 DP 785139 Crest Road, Albion Park. A building envelope is proposed to be created within the lot to which the Environmental Management Area (E3 zoning) will apply, and will be located along the eastern side of the proposed extension of Crest Road (Figure 2). The Environmental Management Area will include the establishment of both an Inner and Outer Bushfire Asset Protection Zone, in areas adjacent to the proposed housing subdivision, and within woodland areas to be retained (Figure 1).



Legend

- Study area
- Environmental management area

Proposed subdivision

- Road
- Proposed lot boundary
- APZ
- Development - APZ
- Development - Building envelope
- Development - Lots
- Development - Roads

Figure 1: Location of the Environmental Management Area, Crest Road, Albion Park NSW

0 10 20 30 40 50

Metres

Scale: 1:1,800 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

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Matter: 18852
Date: 19 July 2016,
Checked by: LH, Drawn by: NMG
Location:\\10.3.0.4\Matters\18800s\18852\Mapping\18852_VMP_F1_StudyArea

Acknowledgements: Imagery (c) Nearmap 2015; Basemap (c) Land and Property Information 2015

Legend

- StudyArea
- Environmental management - Retained Vegetation
- Environmental management - Inner APZ
- Environmental management - Outer APZ

Vegetation community

- Illawarra Lowlands Grassy Woodland - Disturbed
- Illawarra Lowlands Grassy Woodland - Weedy
- Scattered trees

Figure 2: Environmental Management Area overview

0 8.5 17 25.5 34 42.5

Metres

Scale: 1:1,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

N

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2. Methods

2.1 Flora and fauna assessment of the Environmental Management Area

Flora and fauna assessments that have previously been undertaken for the Environmental Management Area and include:

- *Flora and Fauna Assessment. Lot 1011 DP 785139 Crest Road, Albion Park* (ELA 2011).
- *Lot 101 DP 785139, Crest Rd, Albion Park: BioBanking Assessment* (Biosis 2012).

This information has been reviewed and updated within *Lot 101 DP 785139 Crest Road, Albion Park: Flora and Fauna Assessment* (Biosis 2015). Site assessment for significant flora and fauna within the Environmental Management Area is based on a review of all these documents.

A brief review of ecological features within the Environmental Management Area is included in Section 3.

2.2 Additional site investigation

The field survey was undertaken on 5 June 2015. The Environmental Management Area was traversed to assess the vegetation condition and compile an inventory of environmental and noxious weeds species. Notes were also recorded on general condition of the native vegetation observed. Photos were taken and the locations of significant weed infestations were recorded on a hand held GPS.

2.3 Limitations

Site investigations provide a sampling of flora and fauna at a given time and season. There are a number of reasons why not all species will be detected at a site during survey, such as species dormancy and seasonal conditions. During site investigations conducted on 5 June 2015, it was observed that parts of the Environmental Management Area were being continuously grazed, which may not result in a full range of weed species with potential to require treatment following removal of grazing pressures. Similarly, in areas where a monoculture of woody weeds is present, the removal of these species may trigger the germination of stored seed banks of both weeds and native species.

2.4 Legislation and policy

2.4.1 State and federal legislation

The following key biodiversity legislation has been considered in the assessment of the values of the Environmental Management Area and management actions developed:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Threatened Species Conservation Act 1995* (TSC Act)
- *Noxious Weed Act 1993* (NW Act).

2.4.2 Regional biodiversity plans

The following regional biodiversity plans have been considered in the assessment of the values of the Environmental Management Area and management actions developed:

- *Illawarra Biodiversity Strategy. Volume 2 Background Information* (WCC et al 2011)
- *South East Catchment Action Plan 2013 – 2023* (South East LLS)

2.5 Mapping

Land Team Australia Pty Ltd provided a site concept plan showing proposed zonings, indicative lot and Asset Protection Zone (APZ) layout and roads. The Environmental Management Area boundary and proposed zonings were digitised from this concept plan using a Geographic Information System (GIS).

Mapping was conducted using a combination of hand-held (uncorrected) GPS units (WGS84), aerial photo interpretation and a tablet personal computer (PC) with GPS capability. The accuracy of the hand held GPS mapping is subject to the accuracy of the GPS units (generally ± 3 to 7 metres) and dependent on the limitations of aerial photo rectification and registration.

Mapping has been produced using a GIS including spatial data collected in the field and site information transposed from non-spatially referenced plans.

3. Site Description

3.1 General

Site inspection of the Environmental Management Area on 5 June 2015, recorded native vegetation in low to moderate condition variously affected by: historic land clearing; grazing by agisted horses; informal vehicle tracks; weed invasion; storage of general waste materials; erection of informal sheds; soil / waste stockpiling and herbivory by rabbits.

Native vegetation was recorded in the following general conditions within the study as:

- Lacking any significant vegetation in areas containing vehicle tracks, fenced paddock areas, and areas surrounding sheds.
- Open forest containing low, grazed groundcovers with a moderate proportion of native species.
- Closed and open forested canopies in steeper areas with a dense midstorey of woody weeds.

Vegetation has been previously mapped and ground-truthed as detailed within Section 2.1, and is briefly presented within Section 3.2. A more detailed description of vegetation at the site is included within Biosis (2015).

3.2 Landscape connectivity

The Environmental Management Area is at the northern extent of a continuous corridor of vegetation that winds its way south. At its most southern point the vegetation corridor is joined to the Tongarra - Stockyard Mountain to Dunmore Hills regional biodiversity corridor (WCC et al 2011). The surrounding landscape has been modified as a result of agriculture (south) and residential development (north and east) adjacent to the Environmental Management Area.

On a local scale, the Environmental Management Area is within a dispersal corridor for more mobile species including avifauna and arboreal mammals.

3.3 Flora

3.3.1 Native Vegetation of the Environmental Management Area

Forest Red Gum - Thin-leaved Stringybark grassy woodland is supported within the Environmental Management Area, and is consistent with the final determination for Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion, which is listed as an Endangered Ecological Community pursuant to the *NSW Threatened Species Conservation Act* 1995 (TSC Act).

The community supports a canopy of Forest Red Gum *Eucalyptus tereticornis* over both the flatter areas and north east slopes with Thin-leaved Stringybark *Eucalyptus eugenioides* also present. A very sparse midstorey of regenerating canopy species with occasional Hickory Wattle *Acacia implexa*, Maiden's Wattle *Acacia maidenii*, Red Ash *Alphitonia excel*sa, Sticky Hop-bush *Dodonaea viscosa ssp. angustifolia* and Muttonwood *Myrsine variabilis* occurs in these areas.

Shrub species are mostly absent from the understorey in the western portion, as a result of intensive grazing, whilst the understorey on the north east slopes is entirely dominated by Lantana *Lantana camara* with occasional native shrubs on the higher slopes.

The grazed groundcover supports a moderate diversity of native grasses and herbs including Scurvy Weed *Commelina cyanea*, Slender Flat-sedge *Cyperus gracilis*, Slender Tick-trefoil *Desmodium varians*, Kidney Weed *Dichondra repens*, Weeping Grass *Microlaena stipoides var. stipoides* and Basket Grass *Oplismenus imbecillis*. Groundcover species under Lantana thickets on the north east slopes are virtually absent. A sparse cover of native and exotic grasses, herbs and scramblers are present such as Asparagus Fern *Asparagus aethiopicus*, Indian Pennywort *Centella asiatica*, Scurvy Weed *Commelina cyanea*, Cape Ivy *Delairea odorata*, Panic Veldtgrass *Ehrharta erecta* and Wombat Berry *Eustrephus latifolius*.

3.3.2 Significant flora species and fauna habitat

The Environmental Management Area contains one endangered flora species, White Wax Flower *Cynanchum elegans*, which is listed as Endangered under both the *Environmental Protection & Biodiversity Conservation Act*1999 (EPBC Act) and TSC Act. White-flower Wax Plant is present at two locations as shown in Figure 3.

Illawarra Zieria *Zieria granulata* is also listed as Endangered under both the EPBC Act and TSC Act. While not recorded within the Environmental Management Area, there is potential for this species to regenerate from stored soil seed banks following control of dense Lantana (DEC 2005a).

Hollow bearing trees (HBT's), mapped within Figure 3, are present within the Environmental Management Area. While hollows are generally small (between 5 cm and 20 cm), they provide roosting habitat for two threatened microbats Greater Broad-nosed Bat *Scoteanax rueppellii* and Eastern False Pipistrelle *Falsistrellus tasmaniensis*, which are listed under the NSW TSC Act and recorded by Eco Logical (2011) within the Crest Road development study area.

3.3.3 Hollow-bearing trees

Hollow-bearing trees recorded within the Environmental Management Area detailed in Appendix 3, Table 6. A total of 12 hollow-bearing trees were recorded and are shown on Figure 3. One tree was assessed as being unsuitable to provide habitat. The remaining 11 trees contained hollows suitable for fauna including:

- 8 hollows for roosting microbats.
- 4 hollows for breeding small parrot species.
- 5 hollows for breeding medium parrots or small possums.

Species expected to use these hollows have been included in Table 2.

3.3.4 Noxious and Environmental Weeds

Five declared noxious weeds listed under Noxious Weed (Control Order) 2014 for the Shellharbour LGA were recorded within the Environmental Management Area.

Two Class 4 noxious weeds were recorded that require 'the growth of the plant to be suppressed in a manner that continuously inhibits the ability of the plant to spread':

- Lantana
- Blackberry *Rubus fruticosus* aggregate species.

Three additional Class 4 weeds were recorded, including Blackberry require that 'the plant must not be knowingly distributed':

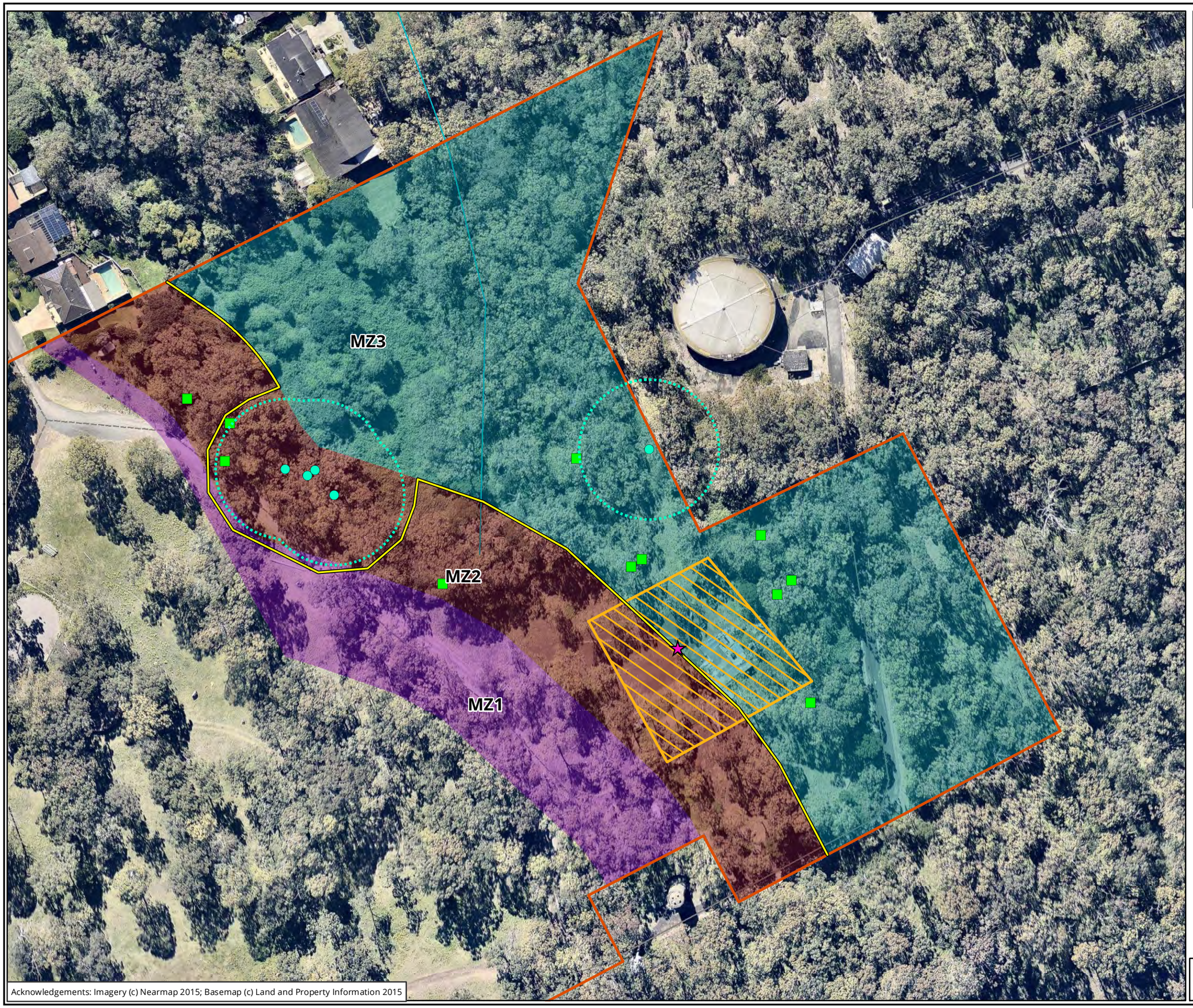
- Bridal Creeper *Asparagus asparagoides*
- Ground Asparagus *Asparagus aethiopicus*
- Fireweed *Senecio madagascariensis*

The Regional Weed Strategy (Southern Rivers CMA et al 2011) provides strategic guidance for weed control priorities within the Illawarra. This document provides priorities for the control of wide spread environmental weeds for locally occurring endangered ecological communities.

Priority weeds that have been identified as a threat to Illawarra lowlands grassy woodland and recorded within the Environmental Management Area include:

- Cape Ivy *Delairea odorata*
- Large Leaved Privet *Ligustrum lucidum*
- Moth Vine *Araujia sericifera*
- Madeira Vine *Anredera cordiifolia*
- Rhodes Grass *Chloris gayana*
- Trad *Tradescantia fluminensis*

Methods for control of noxious and environmental weeds are included in the Section 4.2.2.



Legend

- Study area
- *Cynanchum elegans*
- *Cynanchum elegans* 20m buffer
- Hollow-bearing tree
- Targeted weed removal (Madeira Vine waste pile)
- EMA fenceline
- Low condition - Revegetation area
- Environmental management - Retained Vegetation
- Environmental management - Inner APZ
- Environmental management - Outer APZ

Figure 3: Management zones of the Crest Road Environmental Management Area, Albion Park NSW (including vegetation management zones and ecological features)

0 8 16 24 32 40

Metres

Scale: 1:1,000 @ A3

Coordinate System: GDA 1994 MGA Zone 56

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Matter: 18852
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Location:P:\18800s\18852\Mapping\18852_VMP_F3_ManagementZones_20170413

Acknowledgements: Imagery (c) Nearmap 2015; Basemap (c) Land and Property Information 2015

4. Vegetation Management Plan

4.1 Vegetation management zones

The property has been divided into three management zones (MZ) according to the differing management objectives across the property (Figure 3).

Vegetation management within the Environmental Management Area will include management of APZ's for bushfire protection and ecological outcomes.

The APZ's will require vegetation thinning and management of shrubs and ground fuel levels specific to the Inner (MZ1) and Outer (MZ2) APZ zonings, as detailed within Section 4.1.1and Section 4.1.2. MZ3 is detailed within Section 4.1.3 and managed solely for ecological outcomes.

Revegetation will be required within the Environmental Management Area, where shown in Figure 3. These areas in MZ2 and MZ3 have been subject to intensive agistment impacts and demonstrate a low capacity to regenerate without further intervention. Revegetation specifications that are appropriate for MZ2 for APZ's and MZ3 are provided below in Section 4.2.

Table 3 provides the management zones, objectives for each zone with regard to vegetation management and actions required to achieve the objectives for each zone. Performance measures are also given against the management actions and can be used for monitoring the outcomes of the VMP.

Weed control methods are outlined in Table 1.

4.1.1 Management zone 1 - Inner APZ

Management zone 1 (MZ1 – Inner APZ) is located closest to the proposed Crest Road subdivision. It is located on gently sloping land that is currently grazed. The vegetation is characterised by a tall open native canopy, with sparse midstorey and supporting moderately diverse, closely grazed native and exotic groundcover. Grazing has preserved a moderate diversity of native groundcovers, and also resulted in suppression of most weeds, except those unpalatable to the animals present. This zone will be managed as the "Inner APZ".

This area will be managed to the following specification:

- Canopy to be reduced via tree removal, if required, and maintained to maximum canopy coverage of 15%.
- Lower branches of retained trees to be removed to a height of 2m and should not form a direct canopy linkage.
- Hollow bearing trees will be retained.
- Removal of all fine fuels annually and maintenance of a low and green groundcover.
- Control of noxious and environmental weeds as detailed within Table 1.

Trees removed from MZ1 will be re-used in MZ3 to provide fauna habitat.

Specific management actions and monitoring are detailed within Section 4.2 and Section 4.3, respectively.

4.1.2 Management zone 2 - Outer APZ

Management Zone 2 (MZ2 – Outer APZ) is located east of MZ1 and includes:

- Areas of tall open canopy lacking significant midstorey as described for MZ1.

- Paddock areas that have been subject to intensive grazing.
- Informal structures.
- Other intensive agistment impacts and materials.

This area requires the removal of informal structures, agistment materials, general waste, and stockpiled organic wastes / soils. This zone will be managed as the "Outer APZ".

This area will be managed to the following specification:

- Canopy to be reduced through removal of trees, if required, and maintained to maximum canopy coverage of 30%.
- Lower branches of retained trees to be removed to a height of 2m and should not form a direct canopy linkage.
- Hollow bearing trees will be retained.
- Removal of all fine fuels annually and maintenance of a shrub cover of less than 20 per cent of the area.
- Control of noxious and environmental weeds as detailed within Table 1.

HBTs are to be retained as a priority within MZ2. Trees that are removed from MZ2 will be re-used in MZ3 to supplement fauna habitat. Trees requiring removal from steep slopes will be undertaken by arborists and stumps retained to retain slope stability. Areas where Lantana has been removed and groundcover is not present on steep slopes will require erosion protection using 'jute mesh' pegged at 1.5 metre spacing. These areas should be monitored for natural seedling regeneration after three months. If limited regeneration is occurring, revegetation as per Section 4.2.4 is to be undertaken.

Revegetation is required for the low condition area in MZ2 shown in Figure 3. Specifications are detailed within Section 4.2.3 with other management actions and monitoring detailed within Section 4.2.

4.1.3 Management zone 3 - Retained native vegetation

Management Zone 3 (MZ3 – Retained Native Vegetation) is located east of MZ2. Similar to MZ2, it contains mostly dense Lantana within the understorey of the steeper slopes and gully. MZ3 also contains areas in low condition that have resulted from intensive horse agistment, as described for MZ2. The endangered White-flowered Wax Plant is present in two locations (seven plants) and management of these locations will require adherence to specific control methods detailed in Section 4.2.2.

The key approaches for ecological restoration and management of MZ3, were developed using DEC (2005b), and generally follow the restoration approaches below:

- Retain – Retain remnant indigenous vegetation. Conserving existing native vegetation should be the highest priority.
- Regenerate – where bushland remains but is degraded, regeneration should be the primary objective.
- Revegetate – where there is no regeneration potential, revegetation is then an option.

Applying this approach, the focus should be weed control to assist natural regeneration of native plants within MZ3. Undertaking revegetation is required to improve vegetation condition where there is little potential for short term natural regeneration. The low condition area is shown in Figure 3.

MZ3 will also require fencing from the areas managed as APZ's, with fencing modified as per Figure 3, to protect endangered plants from APZ maintenance works. Further specific management for weed control requirements are detailed below within Section 4.2.

4.2 Specific management directions or actions required

4.2.1 Tree Protection

Hollow bearing trees are to be retained within APZ areas and the Environmental Management area as they provide roosting habitat to threatened microbats (Section 3.3.2).

HBTs and other retained trees are also to be protected from root or trunk damage by limiting access within the drip line of heavy plant during the removal of waste materials and informal structures that are left over from the agistment of horses.

The requirements for the tree protection zones are:

- The boundaries of the tree protection zones should correspond with the canopy spread for each tree.
- Temporary fencing is to be installed around retained trees within MZ3, where structures and waste are to be removed to protect trees from indirect impacts during the construction phase of the project. Fencing should be installed prior to construction works and be maintained throughout the construction phase of the project.
- No equipment, materials or fill are to be stored within tree protection zones.
- No fuel, paints or other chemicals are to be stored within tree protection zones.
- No excavation is to occur within tree protection zones.

4.2.2 Weed control

Table 1 details the weeds present within the property and the general methods for control. The control methods detailed below have been selected from methods detailed in *Noxious and Environmental Weed Control Handbook* (DPI 2011) as the most appropriate treatment for the scale of infestations within the property.

Primary weed control within MZ3 is to be undertaken by a suitable qualified bush regeneration contractor with previous experience undertaking woody weed control within areas containing White-flowered Wax Plant.

Mechanical methods will be restricted to slashing implements using tritter / slashing attachments or similar, as removal of weed cover may increase the risk of erosion (Section 1.3). Cut Lantana canes and other woody weed materials are also to be retained as mulch within MZ3 to reduce the potential for erosion on steep slopes. If areas are lacking in retained mulch cover, installation of 'jute mesh' must be undertaken and pegged at 1.5 m spacing.

White-flowered Wax Plant locations

Areas containing White-flowered Wax-plant that occur within the MZ3 and OPZ will require additional safeguards to protect the plants during weed control and annual fuel reduction tasks. The additional controls include:

- Initial clearing within the fenced-off area be undertaken by a qualified bush regenerator sufficiently experienced at working with the species.
- **All primary weed control within a 20 metre buffer of White-flowered Wax Plant** is to be restricted to manual cut and paint methodologies.

- **No herbicide application by spot spray** within ten metre buffers of known locations will be allowed, due to White-flowered Wax Plant's capacity to sucker at extended distances from the parent plant.
- The known White-flowered Wax-plant locations will be identified and buffer areas marked out prior to starting primary weed control.
- **Mechanical slashing cannot be used to control Lantana within 20 metres of any known location of White-flowered Wax Plant**. This is because there is a high likelihood that unrecorded White-flowered Wax Plant could be growing within areas of Lantana, and has the potential to be established within more open areas.
- Guidance of the mechanical plant operator is to be provided by a suitably qualified ecologist or bush regenerator, skilled in the identification of White-flowered Wax Plant, during trittering. If additional plants are identified during weed control activities, then these areas will be recorded, and control undertaken as per the specification detailed above.

The management of vegetation within the M3 portion of the OPZ will also require the following additional controls:

- Buffer fencing 20 m from White-flowered Wax-plant locations to protect the plant damage during OPZ management.
- All trees or shrubs supporting White-flowered Wax-plant individuals are to be retained within the OPZ as a component of the 20% unmanaged vegetation cover allowable within midstorey and groundcover strata of an OPA.
- All vegetation control activities within the fenced-off area will be undertaken manually, and any trees that require removal will be sectioned and lowered in a way to avoid any damage to individual stems or the adjacent supporting vegetation.

Table 1 Noxious and environmental weeds present and their control method

Scientific name	Common name	Control method
Woody Weeds		
*Lantana camara***	Lantana	Tritter or slashing control outside of White-flowered Wax Plant buffers, with guidance by a qualified ecologist or bush regenerator with experience identifying this species. Cut and paint method within 5m White flowered Wax Plant buffers – Cut woody weeds at the base as close as possible to the ground and paint the freshly cut stem with concentrated Glyphosate based herbicide. This is best done using a poison applicator bottle. Spot spray using appropriate herbicide by suitably qualified contractor outside of 5m White flowered Wax Plant buffers.
Chenopodium album	Fat Hen	
Gomphocarpus fruticosus	Narrow-leaved Cotton Bush	
*Ligustrum lucidum***	Large-leaved Privet	
Senna pendula var glabrata		
Sida rhombifolia	Paddy's Lucerne	
Tagetes minuta	Stinking Roger	
Xanthium occidentale	Noogoora Burr	
Perennials/ Scrambling Weeds		
*Asparagus aethiopicus***	Asparagus Fern	Individual plants/ small numbers: Manual removal - Any fruits present on plants
*Asparagus asparagoides***	Bridal Creeper	

Scientific name	Common name	Control method
		need to be removed prior to manual removal or spraying. For manual removal, the woody rhizome of each plant must be removed. This can be done using a knife for small plants or a mattock for large specimens. Rhizomes and fruit must be removed and disposed of appropriately. Water tubers are not propagules and do not require removal. Spot spray - Larger infestations can be sprayed by a suitable qualified contractor with a diluted Metsulfuron-methyl based herbicide.
Chlorophytum comosum	Spider Plant	Manual removal - Remove rhizome and dispose of appropriately.
Crassula multicava		Manual removal - Remove plant and dispose of appropriately. Spot Spray – Qualified contractor can spraying using appropriate herbicide such as Starane. Further maintenance weeding is likely to be required.
*Tradescantia fluminensis***	Trad	Manual removal - Use a rake for larger infestations. Hand weed smaller infestations and for secondary required following raking. Must remove all part of the plant. Secondary weeding and further maintenance weeding is required to eradicate the infestation. Spot Spray – Qualified contractor can spraying using appropriate herbicide such as Starane. Further maintenance weeding is likely to be required.
Annual and Grass Weeds		
*Chloris gayana***	Rhodes Grass	Small areas or numbers: Manual removal – Any seed heads present on plants need to be removed, taken offsite and disposed of appropriately. Plants can be manually removed by hand or cutting roots below crown. Large areas or numbers: Spot spray - Plants can also be sprayed with diluted Glyphosate based herbicide.
Echinochloa crus-galli	Barnyard Grass	
Ehrharta erecta	Panic Veldt Grass	
Paspalum dilatatum	Paspalum	
Setaria parviflora	Pigeon Grass	
Sporobolus africanus	Parramatta Grass	
Vulpia muralis		
Bidens pilosa	Cobblers Pegs	
Conyza sp	Fleabane	
*Senecio madagascariensis***	Fire weed	

Scientific name	Common name	Control method
Vines		
*Anredera coordiifolia***	Madeira Vine	Remove plants parts, as far as practicable, with identified soil stockpile, do not spread across Environmental Management Area. Dispose of this material to a registered waste disposal facility. Follow-up control: Manual removal of tubers with small mattock or trowel. Spot spray – Qualified contractors can spray with diluted Glyphosate or Starane based herbicide. Repeated follow up treatment will be required to eradicate infestation.
*Delairea odorata***	Cape Ivy	Remove manually, roll and hang to dry and dessicate. During autumn and winter flowering times, remove plant and dispose of at a registered waste disposal facility. Spot spray – Qualified contractors can spray with diluted Glyphosate or Starane based herbicide.
*Araujia sericifera***	Moth Vine	Mature vines: Stem scrape method – Scrape bark from stem from approximately 30 cm along stem to ground level. Apply concentrated Glyphosate based herbicide to the freshly scraped stem. Retain foliage on plant to draw herbicide up through the plant. Follow up treatment will be required to eradicate infestation. Hand weed seedlings and small plants.

** Denotes noxious; or regional priority weed within Illawarra Lowlands Grassy Woodland.

Note: Herbicides should only be used in accordance with the specifications provided on the label and in the Materials Safety Data Sheet (MSDS) for each product.

Further information regarding the control methods detailed in Table 3 is available DPI (2011) http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0017/123317/Noxious-and-environmental-weed-control-handbook.pdf .

This VMP refers to primary, secondary and maintenance weeding within the performance measures (Table 3) and the program of works. An explanation of these terms is given below;

- Primary weeding – the initial weed treatment. This will include the trittering / mechanical slashing, cutting and painting or manual removal of woody weeds and vines and spot spraying or manual removal of perennial and annual weeds.

- Secondary Weeding – following primary weed removal there will be a rapid flush of weed growth resulting from the increased light availability as well as soil disturbance that will trigger the germination of weed seed within the soil. It is important that this secondary weeding is done within 6 weeks following primary weeding and maintained until the weed growth has reduced and the stabilised to prevent the further spread of weeds. Secondary weeding will involve a combination of hand weeding, particularly around plantings and native species, and spot spraying where outside protective buffers.
- Maintenance weeding - There is likely to be a large amount of weed seed stored in the soil as well as weed seed that will enter the property that will require continual weeding following the more intensive secondary weeding. This will include as combination of spot spraying and hand weeding.

4.2.3 Sheds, fences and general waste

MZ2 and MZ3 have highly modified areas which include sheds, fences and general waste. General waste includes old machinery, steel drums, organic materials from animal agistment and / or stored soil piles.

One area contains Madeira Vine over a pile of organic waste or stock piled soil (Figure 3). This area is recommended to be removed prior to weed control or revegetation occurring. Any waste soil should be removed to an appropriate waste disposal facility.

4.2.4 Revegetation

Revegetation is required within the area indicated for MZ2 and MZ3 (Figure 3).

The requirement for revegetation is to restore native groundcover and to a lesser extent native canopy vegetation where fencing of agisted animals has reduced the capacity for natural regeneration to recover within a practical time line.

Recommendation for revegetation within these areas must be consistent with the management outcomes for both zones. Separate recommendations for MZ2 for the outer APZ and MZ3 managed as retained vegetation are detailed below.

A recommended species planting list and planting densities for both zones is included in Appendix 2.

MZ2 – Outer APZ

As the vegetation community within the outer APZ is an EEC, the recommended species have mostly been selected from the final determination (NSWSC 2000). Modifications to this list have been made to be consistent with NSW RFS 'Standards for Asset Protection Zones' which require plants that are less flammable and have the following features (Appendix 2):

- High moisture content
- High levels of salt
- Low volatile oil content of leaves
- Smooth barks without 'ribbons' hanging from branches or trunks
- Dense crown and elevated branches.

MZ2 also requires specific management of shrub layers and canopy cover (4.1.2) therefore planting densities have been provided to provide consistency with APZ requirements.

Planting densities required throughout the Outer APZ revegetation area are:

- Three trees per 100 metres squared.

- 20 shrubs well spaced per 100 metres squared.
- Three grasses and/or groundcovers per metres squared.

Based on an estimated area for revegetation, within MZ2, the area requiring revegetation is approximately 900 square metres. Based on this area and the planting densities required above, MZ2 will require:

- 9 trees
- 180 Shrubs
- 2700 grasses and groundcovers.

Mulching of revegetation within the outer APZ is not to use chipped wood or other organic materials with the capacity to add to ground fuel loads. **Coir mulch mats** are only to be used to retain moisture and assist suppressing weeds during plant establishment.

MZ3 – Retained vegetation

As the vegetation community within the MZ3 is also an EEC, the recommended species has mostly been selected from the final determination (NSWSC 2000) with additions of common species that may also occur.

As the VMP is for woodland it is critical that groundcover vegetation is the focus of plantings (DEC 2005b), and important that the grassland component is not filled with shrubs.

Planting densities required throughout the revegetation area, these are:

- One tree per 25 metres squared
- Five shrubs per 25 metres squared
- Three grasses and/or groundcovers per metres squared.

Based on an estimated area for revegetation, within MZ2, the area requiring revegetation is approximately 1100 square metres. Based on this area and the planting densities required above, MZ2 will require:

- 33 trees
- 220 Shrubs
- 3300 grasses and groundcovers.

Planting preparation

Planting preparation should be conducted as detailed below:

- Conduct primary weed control works. Primary weed control works should be completed within MZ2 and MZ3 consecutively prior to planting.
- Conduct secondary weeding. Secondary weed control will be conducted at least once, six weeks after primary control and prior to mulching.
- Mulch the revegetation area using wood or leaf mulch to a depth of at least 10 centimetres.

Planting

Planting should be conducted as detailed below:

- Use forestry tube stock or Hiko cells of local provenance from the recommended species list given in Appendix 2 as per appropriate to MZ requirements.
- Plant according to the densities and specifications recommended above.

- Installation should be accompanied by plant protection to avoid damage by rabbits.
- Mulching to retain moisture and suppress weeds should be undertaken as appropriate for zone management outcomes.

Maintenance

Revegetation areas will need regular maintenance including maintenance weeding, watering and replacement of any dead plants:

- Maintenance weeding required will include hand weeding around plantings or other native vegetation present and spot spraying as required.
- The minimum amount of watering required for the initial establishment of plantings recommended is twice per week in the first and second weeks following planting then once per week for the following two to four weeks. This watering regime may need to be varied dependent on the season and the amount of rain received.
- The revegetation area should be assessed after the first and second years following planting. Dead plants should be replaced as required.

4.2.5 Hollow offset - nest box installation

Subdivision of Lot 101 DP 785139 Crest Road, Albion Park will result in 9 hollow bearing trees, including a total of 14 individual hollows being removed. Council requires installation of appropriate nest-boxes to offset at 1:1 within the Environmental Management Area to compensate for the loss. Nest boxes are to be installed following primary weed control, to allow for access, and at least 1 month prior to tree removal for the subdivision.

Nest-boxes will supplement habitat for threatened and non-threatened hollow dependent fauna, including microbats, small and medium sized parrots and small possums. Nest boxes installed will be species specific (Table 2) and will be designed to exclude invasive species Specifications and numbers of nest-boxes to be installed are detailed within Table 2.

Installation is to be undertaken by a suitably qualified ecologist and details reported to Council following installation will include:

- Box number
- Target species
- Orientation/Aspect of box
- Height of nest box
- Tree Species box installed on
- Canopy Cover
- Location of closest branch
- Photo of each nest box (close-up and full tree).

Table 2 Nest-box installation specifications

Box Type	Target Species	Brief Description	Entrance Diameter/Internal Diameter	Material	Orientation/Aspect of box	Height of box	Number to be installed for offsets
Open bottom microbat box	Microbats species incl. Eastern False Pipistrelle and Greater Broad-nose Bat.	Unique design of vertical slits where microbat species can squeeze into and roost	200mm x 245mm	Hardwood or thick marine ply (17mm).	Avoid direct sunlight during the day, preferably with some canopy cover over the top	3-5m	9
Vertical nest box	Smaller birds incl. Rosella,. Red-rumped Parrot, Rainbow Lorikeet.	Small opening vertical nest box.	60mm/120mm	Hardwood or thick marine ply (17mm).	Avoid direct sunlight during the day, preferably with some canopy cover over the top	5m	1
Vertical nest box	Medium sized fauna Incl. Ring Tailed Possum, Galah, Corella and King Parrot.	Medium opening vertical nest box.	150mm/200mm	Hardwood or thick marine ply (17mm).	Avoid direct sunlight during the day, preferably with some canopy cover over the top	4-8m	4

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4.3 Monitoring

Under Section 20.2 of the Shellharbour City Council DCP - Remnant vegetation and wetlands, a monitoring and performance evaluation program is required within a VMP. Monitoring must include details of activities undertaken to achieve the management actions in Section 5 and should be supplied to the relevant Council officer on an annual basis for review.

Required reporting to Council

Council will require notification of completion of the following events for inspection:

- Completion of removal of sheds, fences.
- Tagging and establishment of 20 m buffer surrounding White-flowered Wax-plant and fencing of management areas.
- Completion of APZ works by a s 132 qualified bush regenerator within White-flowered Wax-plant protection buffers.
- Completion of primary weed control and installation of erosion control, including 'jute mesh' and pinning specifications used.
- Completion of revegetation.
- Completion of next box installation.

Notifications will be supplied by short letter report via soft copy/ email.

On-going monitoring shall be detailed within an annual report in soft copy/email and supplied to Council in December each year and provide details on:

- Threatened flora.
- APZ management.
- Nest box monitoring.
- Revegetation.
- Erosion control.

4.3.1 Threatened Flora

Annual monitoring will include one photo point and stem counts for each clonal plant/ location where White-flowered Wax-plant is located. Monitoring points will be marked by a permanent wooden stake or star picket.

Annual monitoring will include survey following removal of Lantana for Illawarra Zieria and White-flowered Waxc Plant within 3 months of primary control. If the either plant is recorded recruiting, procedures for weed management will apply as per White-flowered Wax-plant. If no plants are detected, annual targeted survey for these plants will not be continued after 3 years.

4.3.2 MZ1 - Inner APZ and MZ2 - Outer APZ

Monitoring requires annual photo-point monitoring, one within MZ1 and one within MZ2 to monitor understorey and midstorey APZ maintenance is being undertaken, as well as weed control activities. Records of progress should be undertaken once per year in late November to show appropriate management of APZs immediately prior to bushfire season.

4.3.3 MZ3 – Retained vegetation

MZ3 should have photo records taken at least twice per year, in late November and April (after herbaceous weed growth is at its most rapid, to ensure management of weeds is adequate. The performance measures given in Table 3 can be used to ensure the program is progressing successfully.

The frequency of tasks given in the Program of Works (Table 3) should be altered where the specified timing or frequency of tasks (particularly regarding weed control) are not sufficient to meet the performance criteria given.

Photo-points are required within MZ3 for monitoring:

- All known White-flowered Wax Plant locations.
- One representative area where dense Lantana control has been undertaken and erosion control installed.
- One representative area where revegetation has been undertaken.

Details of activities and hours undertaken to achieve the management actions should be supplied to the relevant Council officer on an annual basis.

4.3.4 Nest box monitoring

Nest boxes will be monitored biannually, once between in November and December and again in June. Non-invasive methods should be used such as a scope camera to minimise disturbance of breeding fauna.

Details recorded during monitoring will include but not be limited to:

- Monitoring Date
- Property location
- Nest box number
- Target species or target species group
- Species inhabiting (including fauna presence and/or evidence of scats, fur, scratches, etc)
- Breeding success where appropriate
- Condition of box and attachment
- Box maintenance details, including replacement
- Management actions to remove or exclude invasive species (European Honeybee, Common Myna, Common Starling and House Sparrow).

4.3.5 Revegetation

Annual reporting for revegetation activities will include details of:

- Species and numbers planted initially.
- Percentage survival rate.
- Species installed to supplement losses.
- Annual photo-point record.

4.3.6 Erosion control

Annual reporting for erosion control success will include details of:

- Area of erosion control undertaken using 'jute mesh'.
- Seedling regeneration after 3 months.
- Inspections and activities undertaken to maintain erosion control mesh.
- Percentage establishment of native cover.
- Revegetation activities if required.

5. VMP program and works

The management area has been divided into three zones (Figure 3). These management zones have been established on the basis of specific management zone requirements. Each management zone is assigned specific works and management measures and these are accompanied by a general timing in Table 3.

The program assumes that primary weed control, revegetation and the removal of sheds, fences and waste site, will be completed prior to subdivision completion, and that scheduled maintenance detailed within the VMP will be required by the owner for a period of five years, or as otherwise determined by Council.

Table 3: Vegetation Management Plan by Zone and Task

Zone	Task	Actions Required	Details	Timing of Actions	Evaluation Criteria
MZ1 – Inner Asset Protection Zone	1. Establish monitoring points.	1. Establish one photopoint and monitor annually.	1. Install a star picket to maintain a static location and undertake photopoint monitoring in a north, south, east and west orientation.	1. Monitor photo points annually (spring) and report management details annually.	1. Supplied within VMP monitoring report annually to Council and the PCA.
	2. Primary and secondary weed control.	2a. Undertake primary weed control.	2a & b. Undertake primary and secondary control of Lantana, Blackberry, Vine weeds, Paddy's Lucerne, and Senna pendula var glabrata.	2a.Undertake primary weed control as soon as possible.	2 a-b. Details supplied to council and the PCA annually in VMP monitoring report.
		2b. Undertake secondary control.		2b. Undertake secondary weed control within 6 weeks of initial treatment.	
	3. Undertake APZ establishment.	3a. Mark trees to be removed, retaining HBT's to establish 15% cover.	3a. Undertake removal of marked canopy trees and branches up to 2 metres from ground level. Re-use removed trees and branches for habitat features within MZ3.	3a. Undertake APZ establishment prior to construction of dwellings. Placement of tree materials into MZ3, during tree removal and branch pruning.	3 a-c. Details supplied to council and the PCA annually in VMP monitoring report.
		3b. Slash groundcovers and prune all branches up to 2m in height on retain trees.	3b. Undertaken regular slashing of MZ1 and branch pruning.	3b. Slashing undertaken at a minimum of a quarterly basis, branch pruning undertaken annually.	
		3c. Other annual APZ management activities.	3c. Rake fine fuels (leaves and sticks) and remove from MZ1 annually prior to fire season.	3c. Fine fuel removal annually, completed before the end of November.	
	4. Maintenance weed control.	4. Maintenance weed control.	4. Maintenance weed control.	4. Maintenance weed control to be undertaken at three times annually, for the life of the VMP and as on-going maintenance: Spring (Oct-Nov), Summer (Feb-Mar), Autumn (May).	4 a. Noxious weeds to be maintained as per Section 3.3.3 and environmental weeds to be maintained below 10% cover..
	5. Threatened species and next box monitoring	5a. Monitor for persistence and recruitment of *Cynanchum elegans* and *Zieria granulata*	5a. Undertake photo point recording and stem count for known locations, visual inspection and record new locations of *Cynanchum elegans* and *Zieria granulata*.	5a. Undertake threatened flora monitoring annually.	5 a - b. Details to be supplied to council and the PCA annually in VMP monitoring report.
		5b. Monitor for next box use using scope camera or other non-invasive methods in Section 4.3.	5b. Undertake visual inspection and record presence of fauna.	5b. Undertake next box monitoring between November/December and June.	
	6. Fence boundary of zone	6. Establish boundary fencing along the western boundary of MZ1	6. Establish three string post and rail fence along western boundary of MZ1.	6. Establish fenceline as soon as possible.	6. Visual inspection of completion by Council on completion.
MZ2 – Outer Asset Protection Zone	1a. Establish monitoring points.	1a. Establish one photopoint and monitor annually.	1a. Install a star picket to maintain a static location and undertake photopoint monitoring in a north, south, east and west orientation.	1a. Monitor photo points annually and report management details annually.	1a. Supplied within VMP monitoring report annually to Council and the PCA.
	1b. Establish *Cynanchum elegans* locations.	1b. Locate and markout *Cynanchum elegans* stems and establish a 20 m buffer within APZ.	1b. Mark *Cynanchum* stems with high visibility tape and isolate/ clearly mark shrubs or trees used by the endangered vine to be retained. and establish 20 metre buffer to avoid damage during APZ installment.	1b. Prior to installing APZ or undertaking weed control.	1b. Number of stems and photopoint locations including within initial VMP monitoring report annually to Council and the PCA.

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Zone	Task	Actions Required	Details	Timing of Actions	Evaluation Criteria
	2. Primary and secondary weed control.	2a. Undertake primary weed control.	2a & b. Undertake primary and secondary control of Lantana, Blackberry, Vine weeds, Paddy's Lucerne, and Senna pendula var glabrata.	2a. Undertake primary weed control as soon as possible.	2 a-b. Details supplied to council and the PCA annually in VMP monitoring .report.
		2b. Undertake secondary control.		2b. Undertake secondary weed control within 6 weeks of initial treatment.	
	3. Undertake APZ establishment.	3a. Mark trees to be removed, retaining HBT's to establish 30% cover.	3a. Undertake removal of marked canopy trees and branches up to 2 metres from ground level. Re-use removed trees and branches for habitat features within MZ3.	3a. Undertake APZ establishment prior to construction of dwellings. Placement of tree materials into MZ3, during tree removal and branch pruning.	3 a-d. Details supplied to council and the PCA annually in VMP monitoring report.
		3b. Prune all branches up to 2m in height on retain trees.	3b. Undertaken regular slashing of MZ1 and branch pruning.	3b. Slashing undertaken at a minimum of a quarterly basis, branch pruning undertaken annually.	
		3c. Mark out and locate *Cynanchum elegans* stems prior to reducing shrub cover, with detailed fine fuel management within 20 m Cynancum elegans habitat buffer.	3c. APZ reduction of shrubs and fine fuels undertaken by qualified bush regeneration contractor, as per Specification in Section 4.2.2.	3c. Undertake control of weeds and fuels within the Cynanchum bufferon an biannual to annual basis.	
		3d. Annual APZ management activities.	3d. Rake fine fuels (leaves and sticks) and remove from MZ2 annually prior to fire season.	3d. Fine fuel removal annually, completed before the end of November.	
	4. Clear site of agistment materials.	4. Remove sheds, fences, general waste, and stockpiled organic material and soils stockpiles from MZ2.	4. Remove shed materials, fence pickets, fencing wire, general waste, any non- natural wood products, remove stockpiles of soil and manure with Madeira Vine to a registered waste disposal facility.	4. Undertake removal as soon as possible.	4. Visual inspection on completion by Council on completion.
	5. Install and maintain erosion protection in steep areas where lantana has been removed and mulch cover is not present.	5a Install 'jute mesh' in steep areas lacking mulch cover.	5a. Installation of 'jute mesh' in steeper areas lacking mulch cover.	5a. Installation of erosion control, immediately following APZ establishment and Lantana control, if required.	5a. Visual inspection on completion by Council on completion.
		5b. Monitor for natural regeneration trigger to undertake revegetation.	5b. Visually inspect the seedling regeneration and make recommendations for revegetation requirements.	5b. Monitor seedling regeneration three months from Lantana removal. Revegetation to be undertaken at a time determined by Council.	5b. Visual inspection by Council with proponent or their representative after 3 months.
		5c. Monitor 'jute mesh' for lifting or undermining' to undertake revegetation.	5c. Visually inspect the 'jute mesh' on a quarterly basis and re-peg if required.	5c. Monitor until establishment of greater than 50 % native groundcover has occurred.	5c. Annual visual inspection by Council until completion of 3 year or establishment of groundcover greater than 50%.
	6. Revegetation of low condition area	6a. Control weeds prior to planting.	6a. Control alll weeds prior to planting to provide optimal establishment.	6a. Control weeds 6 weeks prior to planting.	6a-c. Annual visual inspection by Council until completion of 3 year, 80% success rate for survival.
		6b. Undertake planting of trees, shrubs and groundcovers	6b. Revegetation as per the specifications in Section 4.1.2.	6b. Planting 6 weeks after weed control.	
		6c. Undertake revegetation aftercare (watering and weeding)	6c. Revegetation aftercare, watering and weeding.	6c. Revegetation aftercare as per Section 4.2.4.	
	7. Maintenance weed control.	7. Maintenance weed control.	7. Maintenance weed control.	7. Maintenance weed control to be undertaken at three times annually, for the life of the VMP and as on-going maintenance: Spring (Oct-Nov), Summer (Feb-Mar), Autumn (May).	7 a. Noxious weeds to be maintained as per Section 3.3.3 and environmental weeds to be maintained below 10% cover.

Zone	Task	Actions Required	Details	Timing of Actions	Evaluation Criteria
	8. Threatened species and next box monitoring	8a. Monitor for persistence and recruitment of *Cynnachum elegans* and *Zieria granulata*	8a. Undertake photo point recording and stem count for known locations managed for asset protection, visual inspection and record new locations of *Cynnachum elegans* and *Zieria granulata*.	8a. Undertake threatened flora monitoring annually.	8a-b. Details to be supplied to council annually in VMP monitoring report.
		8b. Monitor for next box use using scope camera or other non-invasive methods in Section 4.3.	8b. Undertake visual inspection and record presence of fauna using next boxes.	8b. Undertake next box monitoring in November/December and June.	
	9. Fence boundary of zone including Cynanchum elegans APZ management area	9. Establish boundary fencing along the eastern boundary of MZ2	9. Establish three string post and rail fence along eastern boundary of MZ2.	9. Establish fenceline as soon as possible.	9. Visual inspection of completion by Council on completion.
MZ3 – Retained Native Vegetation	1.Establish monitoring points as per Section 4.3 for MZ3.	1. Establish photopoints and monitor annually.	1. Install star pickets to maintain a static location, undertake photopoint monitoring in a north, south, east and west orientation for dense lantana area and a single shot representative of revegetation area.	1. Monitor photopoints annually and report management details annually.	1. Supplied within VMP monitoring report annually to Council and the PCA.
	1b. Establish *Cynanchum elegans* locations.	1b. Locate and markout *Cynanchum elegans* stems.	1b. Mark *Cynanchum* stems with high visibility tape and isolate/ clearly mark shrubs or trees used by the endangered vine to be reatained and avoid damage during APZ installment.	1b. Prior to installing APZ or undertaking weed control.	1b. Number of stems and photopoint locations including within initial VMP monitoring report annually to Council and the PCA.
	2. Primary and secondary weed control.	2a. Undertake primary weed control using slashing or manual control methods dependent on slope and accessibility (excluding White Flowered Wax Plant buffers).	2a. Undertake primary weed control as soon as possible.	2a.Undertake primary weed control as soon as possible.	2 a-b. Details supplied to council and the PCA annually in VMP monitoring report.
		2b. Undertake secondary weed control.	2a & b. Undertake primary and secondary control of Lantana, Blackberry, Vine weeds, Paddy's Lucerne, and Senna pendula var glabrata.	2b. Undertake secondary weed control within 6 weeks of initial treatment.	
	3. Install and maintain erosion protection in steep areas where lantana has been removed and mulch cover is not present.	3a. Install 'jute mesh' in steep areas lacking mulch cover.	3a Installation of 'jute mesh' in steeper areas lacking mulch cover.	3a. Installation of erosion control, immediately following APZ establishment and Lantana control, if required.	3a. Visual inspection on completion by Council on completion.
		3b. Monitor for natural regeneration trigger to undertake revegetation.	3b. Visually inspect the seedling regeneration and make recommendations for revegetation requirements.	5b. Monitor seedling regeneration three months from Lantana removal. Revegetation to be undertaken at a time determined by Council.	3b. Visual inspection by Council with proponent or their representative after 3 months.
		3c. Monitor 'jute mesh' for lifting or undermining' to undertake revegetation.	3c. Visually inspect the 'jute mesh' on a quarterly basis and re-peg if required.	3c. Monitor until establishment of greater than 50 % native groundcover has occurred.	3c. Annual visual inspection by Council until completion of 3 year or establishment of groundcover greater than 50%.
	4. Habitat embellishment of MZ3	4. Transfer cut logs, stumps and finer materials to MZ3 for placement as habitat and additional	4. Arrange tree materials cross slope and re-use finer upper branches as brush matting to assist in the establishment of canopy species.	4. Undertaken following installation of jute mesh.	4. Visual inspection on completion by Council on completion.

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Zone	Task	Actions Required	Details	Timing of Actions	Evaluation Criteria
		brush matting.			
	5. Revegetation of low condition area	5a. Control weeds prior to planting.	5a. Control alll weeds prior to planting to provide optimal establishment.	5a. Control weeds 6 weeks prior to planting.	5a-c. Annual visual inspection by Council until completion of 3 year VMP, 80% success rate for survival.
		5b. Undertake planting of trees, shrubs and groundcovers	5b. Revegetation as per the specifications in Section 4.1.2.	5b. Planting 6 weeks after weed control.	
		5c. Undertake revegetation aftercare (watering and weeding)	5c. Revegetation aftercare, watering and weeding.	5c. Revegetation aftercare as per Section 4.2.4.	
	6. Maintenance weed control.	6. Maintenance weed control.	6. Maintenance weed control.	6. Maintenance weed control to be undertaken at three times annually, for the life of the VMP and as on-going maintenance: Spring (Oct-Nov), Summer (Feb-Mar), Autumn (May).	6 a. Noxious weeds to be maintained as per Section 3.3.3 and environmental weeds to be maintained below 10% cover
	7. Threatened species and next box monitoring	7a. Monitor for persistence and recruitment of *Cynanchum elegans* and *Zieria granulata*	7a. Undertake photo point recording and stem count for known locations managed for asset protection, visual inspection and record new locations of *Cynanchum elegans* and *Zieria granulata.*	7a. Undertake threatened flora monitoring annually.	7a-b. Details to be supplied to council annually in VMP monitoring report.
		7b. Monitor for next box use using scope camera or other non-invasive methods in Section 4.3.	7b. Undertake visual inspection and record presence of fauna using next boxes.	7b. Undertake next box monitoring in November/December and June.	

*Note – Weed control timing is a guide only, timing of weed control events may vary depending on seasonal variation in rainfall and climatic regimes. Some weeds require seasonal targeting to remove seed or propagule sources as per

Table 1

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Appendices

Appendix 1: Flora Species Inventory

A1.1 Flora species recorded from the Environmental Management Area

Notes to tables:

EPBC Act: CR - Critically Endangered EN - Endangered VU - Vulnerable	**TSC Act:** C1 – critically endangered E1 – endangered (Part 1, Schedule 1) E2 – endangered (Part 2, Schedule 1) E4 – presumed extinct (Part 4, Schedule 1) V1 – vulnerable (Part 1, Schedule 2) **Bold** denotes characteristic flora species from Final Determinations for TEC's
General status: # - Native species outside natural range * - Exotic (not native to Australia) ** - Noxious weed species declared under the *Noxious Weeds Act* 1993	**Noxious weed status:** SP State prohibited species (Class 1) RP Regionally prohibited species (Class 2) RC Regionally controlled species (Class 3) RR Regionally restricted species (Class 4) R Restricted plant (Class 5)

Table 4: Flora species recorded from the Environmental Management Area and apprio

Status	Family	Genus species	Common Name
	Fabaceae - Mimosoideae	*Acacia binervata*	Two-veined Hickory
	Fabaceae - Mimosoideae	*Acacia fimbriata*	Fringed Wattle
	Fabaceae - Mimosoideae	*Acacia implexa*	Hickory Wattle
	Fabaceae - Mimosoideae	*Acacia maidenii*	Maiden's Wattle
	Fabaceae - Mimosoideae	*Acacia mearnsii*	Black Wattle
	Fabaceae - Mimosoideae	*Acacia parramattensis*	Sydney Green Wattle

Status	Family	Genus species	Common Name
*	Fabaceae - Mimosoideae	*Acacia podalyriifolia*	Queensland Silver Wattle
	Fabaceae - Mimosoideae	*Acacia saliciformis*	
*	Polygonaceae	*Acetosella vulgaris*	Sorrel
	Myrtaceae	*Acmena smithii*	Lilly Pilly
	Sapindaceae	*Alectryon subcinereus*	Native Quince
	Rhamnaceae	*Alphitonia excelsa*	Red Ash
	Loranthaceae	*Amyema pendulum ssp*	
*	Primulaceae	*Anagallis arvensis*	Scarlet Pimpernel
	Commelinaceae	*Aneilema acuminatum*	
	Aphanopetalaceae	*Aphanopetalum resinosum*	Gum Vine
*	Apocynaceae	*Araujia sericifera*	Moth Vine
*	Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern
**RR	Asparagaceae	*Asparagus asparagoides*	Bridal Creeper
	Poaceae	*Austrostipa ramosissima*	Stout Bamboo Grass
*	Asteraceae	*Bidens pilosa*	Cobblers Pegs
	Poaceae	*Bothriochloa macra*	Red Grass
	Sterculiaceae	*Brachychiton populneus*	Kurrajong
	Euphorbiaceae	*Breynia oblongifolia*	Coffee Bush
*	Poaceae	*Briza subaristata*	
*	Poaceae	*Bromus catharticus*	Praire Grass
	Myrtaceae	*Callistemon salignus*	Willow Bottlebrush
	Cyperaceae	*Carex inversa*	
	Cyperaceae	*Carex longebrachiata*	

Status	Family	Genus species	Common Name
	Vitaceae	*Cayratia clematidea*	Native Grape
	Apiaceae	*Centella asiatica*	Indian Pennywort
*	Chenopodiaceae	*Chenopodium album*	Fat Hen
	Chenopodiaceae	*Chenopodium pumilio*	Small Crumbweed
*	Poaceae	*Chloris gayana*	Rhodes Grass
*	Anthericaceae	*Chlorophytum comosum*	Spider Plant
	Vitaceae	*Cissus hypoglauca*	Water Vine
	Ranunculaceae	*Clematis aristata*	Old Man's Beard
	Verbenaceae	*Clerodendrum tomentosum*	Hairy Clerodendrum
	Commelinaceae	*Commelina cyanea*	Scurvy Weed
*	Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane
*	Crassulaceae	*Crassula multicava*	
	Cyatheaceae	*Cyathea australis*	Black Tree-fern
	Rubiaceae	*Cyclophyllum longipetalum*	Coast Canthium
EN, E1	Apocynaceae	*Cynanchum elegans*	
	Poaceae	*Cynodon dactylon*	Couch
	Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge
	Cyperaceae	*Cyperus imbecillis*	
*	Cyperaceae	*Cyperus sp*	
*	Asteraceae	*Delairea odorata*	Cape Ivy
	Fabaceae - Faboideae	*Desmodium varians*	Slender Tick-trefoil
	Phormiaceae	*Dianella revoluta ssp revoluta*	Blueberry Lily
	Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass

Status	Family	Genus species	Common Name
	Convolvulaceae	*Dichondra repens*	Kidney Weed
*	Poaceae	*Digitaria sanguinalis*	Summer Grass
	Sapindaceae	*Dodonaea viscosa* ssp *angustifolia*	Sticky Hop-bush
*	Poaceae	*Echinochloa crus-galli*	Barnyard Grass
	Poaceae	*Echinopogon caespitosus var caespitosus*	Tufted Hedgehog-grass
	Poaceae	*Echinopogon ovatus*	Forest Hedgehog Grass
*	Poaceae	*Ehrharta erecta*	Panic Veldtgrass
	Chenopodiaceae	*Einadia hastata*	Berry Saltbush
	Chenopodiaceae	*Einadia trigonos ssp trigonos*	Fishweed
	Celastraceae	*Elaeodendron australe*	
	Poaceae	*Entolasia marginata*	Bordered Panic
	Poaceae	*Entolasia stricta*	Wiry Panic
	Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass
	Myrtaceae	*Eucalyptus amplifolia* ssp *amplifolia*	Cabbage Gum
	Myrtaceae	*Eucalyptus eugenioides*	Thin-leaved Stringybark
	Myrtaceae	*Eucalyptus quadrangulata*	White-topped Box
	Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum
	Asteraceae	*Euchiton involucratus*	Star Cudweed
	Asteraceae	*Euchiton sphaericus*	
*	Euphorbiaceae	*Euphorbia peplus*	Petty Spurge
	Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
	Santalaceae	*Exocarpos cupressiformis*	Cherry Ballart
	Moraceae	*Ficus macrophylla*	Moreton Bay Fig

Status	Family	Genus species	Common Name
*	Fumariaceae	*Fumaria bastardii*	Bastards Fumitory
	Cyperaceae	*Gahnia aspera*	Rough Saw-sedge
*	Asteraceae	*Gamochaeta americana*	Cudweed
*	Asteraceae	*Gamochaeta* sp	
	Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily
	Geraniaceae	*Geranium homeanum*	Native Geranium
	Geraniaceae	*Geranium solanderi* ssp *solanderi*	Native Geranium
	Poaceae	*Glyceria* sp	
	Fabaceae - Faboideae	*Glycine clandestina*	
	Fabaceae - Faboideae	*Glycine microphylla*	Small-leaf glycine
	Fabaceae - Faboideae	*Glycine tabacina*	
*	Apocynaceae	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush
	Fabaceae - Faboideae	*Hardenbergia violacea*	Purple Coral Pea
	Dilleniaceae	*Hibbertia scandens*	Climbing Guinea Flower
	Malvaceae	*Hibiscus heterophyllus* ssp *heterophyllus*	Native Rosella
	Clusiaceae	*Hypericum japonicum*	
*	Asteraceae	*Hypochaeris radicata*	Catsear
*	Asteraceae	*Hypochaeris* sp	White Flatweed
	Hypoxidaceae	*Hypoxis hygrometrica*	Golden Weather-grass
*	Balsaminaceae	*Impatiens walleriana*	
	Fabaceae - Faboideae	*Indigofera australis*	Australian Indigo
	Poaceae	*Joycea pallida*	Silvertop Wallaby Grass
	Juncaceae	*Juncus usitatus*	Common Rush

Status	Family	Genus species	Common Name
	Fabaceae - Faboideae	*Kennedia rubicunda*	Dusky Coral Pea
**RR	Verbenaceae	*Lantana camara*	Lantana
	Menispermaceae	*Legnephora moorei*	Round-leaf Vine
*	Brassicaceae	*Lepidium* sp	
	Ericaceae - Styphelioideae	*Leucopogon juniperinus*	Prickly Beard-heath
*	Oleaceae	*Ligustrum lucidum*	Large Leaved Privet
	Arecaceae	*Livistona australis*	Cabbage Fan-palm
*	Poaceae	*Lolium perenne*	Perennial Ryegrass
	Moraceae	*Maclura cochinchinensis*	Cockspur Thorn
	Apocynaceae	*Marsdenia rostrata*	Milk Vine
*	Fabaceae - Faboideae	*Medicago lupulina*	Black Medic
	Myrtaceae	*Melaleuca styphelioides*	Prickly-leaved Tea Tree
	Meliaceae	*Melia azedarach*	White Cedar
	Violaceae	*Melicytus dentatus*	Tree Violet
	Poaceae	*Microlaena stipoides* var *stipoides*	Weeping Grass
*	Malvaceae	*Modiola caroliniana*	Red-flowered Mallow
	Myrsinaceae	*Myrsine variabilis*	
	Oleaceae	*Notelaea ovata*	
	Oleaceae	*Notelaea venosa*	Veined Mock-olive
	Asteraceae	*Olearia viscidula*	Wallaby Weed
	Poaceae	*Oplismenus aemulus*	Oplismenus
	Poaceae	*Oplismenus imbecillis*	Oplismenus
*	Oxalidaceae	*Oxalis corniculata*	

Status	Family	Genus species	Common Name
	Oxalidaceae	*Oxalis exilis*	
	Oxalidaceae	*Oxalis perennans*	
	Bignoniaceae	*Pandorea pandorana*	Wonga Wonga Vine
*	Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort
	Apocynaceae	*Parsonsia straminea*	Common Silkpod
*	Poaceae	*Paspalum dilatatum*	Paspalum
*	Passifloraceae	*Passiflora subpeltata*	White Passionflower
*	Poaceae	*Pennisetum clandestinum*	Kikuyu Grass
*	Phytolaccaceae	*Phytolacca octandra*	Inkweed
*	Pinaceae	*Pinus radiata*	Radiata Pine
	Pittosporaceae	*Pittosporum multiflorum*	Orange Thorn
	Pittosporaceae	*Pittosporum revolutum*	Wild Yellow Jasmine
	Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
*	Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues
	Lamiaceae	*Plectranthus parviflorus*	Cockspur Flower
	Poaceae	*Poa affinis*	Poa
	Poaceae	*Poa labillardierei*	Tussock Grass
	Euphorbiaceae	*Poranthera microphylla*	
	Portulacaceae	*Portulaca oleracea*	Pigweed
	Lobeliaceae	*Pratia purpurascens*	Whiteroot
	Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower
	Rosaceae	*Rubus parvifolius*	Native Raspberry
	Santalaceae	*Santalum obtusifolium*	Blunt Sandalwood

Status	Family	Genus species	Common Name
*	Asteraceae	*Senecio madagascariensis*	Fireweed
*	Fabaceae - Caesalpinioideae	*Senna pendula* var *glabrata*	
*	Poaceae	*Setaria gracilis*	Slender Pigeon Grass
*	Malvaceae	*Sida rhombifolia*	Paddy's Lucerne
	Asteraceae	*Sigesbeckia orientalis* ssp *orientalis*	
*	Solanaceae	*Solanum linnaeanum*	
*	Solanaceae	*Solanum mauritianum*	
*	Solanaceae	*Solanum nigrum*	Black-berry Nightshade
*	Asteraceae	*Sonchus oleraceus*	Common Sowthistle
*	Poaceae	*Sporobolus africanus*	Parramatta Grass
	Poaceae	*Sporobolus elongatus*	Slender Rat's Tail Grass
*	Caryophyllaceae	*Stellaria media*	Common Chickweed
*	Poaceae	*Stenotaphrum secundatum*	Buffalo Grass
	Moraceae	*Streblus brunonianus*	Whalebone Tree
*	Asteraceae	*Tagetes minuta*	Stinking Roger
*	Asteraceae	*Taraxacum officinale*	Dandelion
*	Bignoniaceae	*Tecoma capensis*	Cape Honeysuckle
	Poaceae	*Themeda australis*	Kangaroo Grass
*	Commelinaceae	*Tradescantia fluminensis*	Wandering Jew
*	Fabaceae - Faboideae	*Trifolium repens*	White Clover
	Apocynaceae	*Tylophora barbata*	Bearded Tylophora
*	Verbenaceae	*Verbena bonariensis*	Purpletop
	Asteraceae	*Vernonia cinerea* ssp *cinerea*	

Status	Family	Genus species	Common Name
	Scrophulariaceae	*Veronica calycina*	Hairy Speedwell
	Scrophulariaceae	*Veronica plebeia*	Trailing Speedwell
*	Poaceae	*Vulpia muralis*	
	Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell
	Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell
*	Asteraceae	*Xanthium occidentale*	Noogoora Burr
	Asteraceae	*Xerochrysum bracteatum*	Golden Everlasting
	Fabaceae - Faboideae	*Zornia dyctiocarpa*	Zornia

Appendix 2: Revegetation List

Table 5: Revegetation list and specifications for Environmental Management Area

Scientific name	Common name	Planting Density	
Trees			
*Appropriate for planting in MZ2 – Outer APZ		MZ2 – Outer APZ	MZ3 – Retained Vegetation
Acacia falcata		1 plant per 25 m²	3 plants per 100 m² for appropriate APZ species
Acacia implexa	Hickory Wattle		
*Acacia maidenii**	Maiden's Wattle		
Acacia mearnsii	Black Wattle		
*Allocasuarina littoralis**	Black She-Oak		
Alphitonia excelsa *			
*Angophora floribunda**	Rough-barked Apple		
*Brachychiton populneus**	Kurrajong		
*Bursaria spinosa**	Native Blackthorn		
Callistemon salignus	Willow Bottlebrush		
*Eucalyptus amplifolia**	Cabbage Gum		
*Eucalyptus bosistoana**	Coast Grey Box		
*Eucalyptus eugenioides**	Thin-leaved Stringybark		
*Eucalyptus tereticornis**	Forest Red Gum		
Melaleuca decora			
Melaleuca styphelioides	Prickly-leaved Tea Tree		
Shrubs			
*Citriobatus pauciflorus**	Orange Thorn	5 plants per 25 m²	20 plants per 100 m² for appropriate APZ species
*Daviesia genistifolia**	Broom Bitter Pea		
*Daviesia ulicifolia**	Gorse Bitter Pea		
*Dodonaea viscosa var angustifolia**			
*Indigofera australis**	Australian Indigo		
*Jacksonia scoparia**	Dogwood		
*Leucopogon juniperinum**			

Scientific name	Common name	Planting Density	
*Pittosporum revolutum**			
*Pultenaea retusa**			
*Pultenaea villosa**	Hairy Bush-pea		
Grasses & Groundcovers			
Aristida ramosa	Purple Wiregrass	3 plants per 1 m²	3 plants per 1 m²
Aristida vagans	Threeawn Speargrass		
*Athropodium milleflorum**			
Bothriochloa macra	Red Grass		
*Carex longebrachiata**			
*Cheilanthes sieberi**	Rock Fern		
Cymbopogon refractus	Barbed Wire Grass		
*Desmodium rhytidophyllum**			
*Desmodium varians**	Slender Tick-trefoil		
*Dianella revoluta**	Blueberry Lily		
*Dichondra repens**	Kidney Weed		
Echinopogon caespitosus	Bushy Hedgehog-grass		
Echinopogon ovatus	Forest Hedgehog Grass		
Entolasia stricta	Wiry Panic		
Eragrostis leptostachya	Paddock Lovegrass		
*Gahnia radula**			
*Geitonoplesium cymosum**	Scrambling Lily		
*Goodenia hederacea subsp hederacea**			
*Hardenbergia violacea**	False Sarsaparilla		
*Hibbertia aspera**	Rough Guinea Flower		
*Kennedia rubicunda**	Dusky Coral Pea		
*Lepidosperma laterale**	Variable Sword-sedge		
*Lomandra filiformis**	Wattle Matt-rush		
*Lomandra multiflora**	Many-flowered Mat-rush		
Lomandra longifolia	Spiny-headed Mat-rush		

Scientific name	Common name	Planting Density	
*Microlaena stipoides**	Weeping Grass		
Oplismenus aemulus			
Oplismenus imbecillis			
Parsonsia straminea	Common Silkpod		
*Plectranthus parviflorus**			
Poa labillardieri			
*Pratia purpurascens**	Whiteroot		
*Rubus parvifolius**	Native Raspberry		
*Stellaria flaccida**			
Themeda australis	Kangaroo Grass		

Appendix 3: Hollow-bearing tree inventory

Table 6 Hollow bearing trees recorded within the environmental management area

HBT label	Hollow size/ features	Suitability for fauna occupancy	Removal predicted	Species Targeted	Type of compensatory habitat	Photo
6	15 cm branch hollow, very shallow	Unsuitable habitat	No, not Applicable	Not Applicable	Not Applicable	
7	10cm branch hollow	Small parrot species	No, retained within Lot 73	Not required		

HBT label	Hollow size/ features	Suitability for fauna occupancy	Removal predicted	Species Targeted	Type of compensatory habitat	Photo
8	10cm trunk hollow, rubble filled.	Unsuitable habitat.	Not Applicable	Not Applicable	Not Applicable	
9	5cm, dead branch	Microbat species	No, retained within Lot 73	Not required	Not required	

HBT label	Hollow size/ features	Suitability for fauna occupancy	Removal predicted	Species Targeted	Type of compensatory habitat	Photo
10	10 cm trunk hollow	Small parrot species	No, retained within Lot 73	Not required		
11	10cm trunk hollow	Small parrot species	No, retained within Lot 73	Not required	Not required	
	10cm trunk hollow	Small parrot species		Not required	Not required	
	10cm trunk hollow	Small parrot species		Not required	Not required	

HBT label	Hollow size/ features	Suitability for fauna occupancy	Removal predicted	Species Targeted	Type of compensatory habitat	Photo
	10cm trunk hollow	Small parrot species		Not required	Not required	
	20 cm trunk hollow	Medium sized parrots and small possums		Not required	Not required	
12	5cm trunk hollow	Microbat species	No, retained within Lot 73	Not required	Not required	

HBT label	Hollow size/ features	Suitability for fauna occupancy	Removal predicted	Species Targeted	Type of compensatory habitat	Photo
13	5cm tube hollow in branch	Microbat species	No, retained within Lot 73	Not required	Not required	
14	5cm branch hollow	Microbat species	No, retained within Lot 73	Not required	Not required	
	10cm trunk hollow	Small parrot species		Not required	Not required	
	20cm trunk hollow	Medium sized parrots and small possums		Not required	Not required	

HBT label	Hollow size/ features	Suitability for fauna occupancy	Removal predicted	Species Targeted	Type of compensatory habitat	Photo
	30 cm trunk hollow	Medium sized parrots and small possums		Not required	Not required	
15	15cm tube hollow in branch	Medium sized parrots and small possums	No, retained within Lot 73	Not required	Not required	
16	5cm branch hollow	Microbat species	No, retained within Lot 73	Not required	Not required	
	10 cm branch hollow	Microbat species		Not required	Not required	

HBT label	Hollow size/ features	Suitability for fauna occupancy	Removal predicted	Species Targeted	Type of compensatory habitat	Photo
	10 cm trunk hollow	Small parrot species		Not required	Not required	
	25 cm trunk hollow	Medium sized parrots and small possums		Not required	Not required	
	30 cm trunk hollow	Medium sized parrots and small possums		Not required	Not required	
17	5cm branch hollow	Microbat species	No, retained within Lot 73	Not required	Not required	
	5cm branch hollow	Microbat species		Not required	Not required	

HBT label	Hollow size/ features	Suitability for fauna occupancy	Removal predicted	Species Targeted	Type of compensatory habitat	Photo
18	15cm trunk hollow, obstructed	Unsuitable habitat	Not Applicable	Not Applicable	Not Applicable