Thomas Hogan Reserve

Ecological Restoration Action Plan

FINAL REPORT

Prepared for Waverley Council

7 September 2018

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- Department of the Environment and Energy for access to the Protected Matters Search Tool of the Australian Government
- NSW Office of Environment and Heritage for access to the BioNet Atlas of NSW Wildlife.

Biosis staff involved in this project were:

- Paul Price
- Gareth Jones (mapping)

Contents

Tables

Figures

1 Introduction

1.1 Project background

Biosis Pty Ltd was commissioned by Waverley Council (Council) to develop an Ecological Restoration Action Plan (ERAP) to guide Council's ongoing maintenance of Thomas Hogan Reserve, Bondi (study area) (Figure 1). It is understood that the ERAP is required to provide Council with staged guidance to create a stable and self-sustaining ecosystem complimentary to that of the current uses of the council asset, whilst providing habitat opportunities for native flora/fauna species and linkages to Council identified biodiversity corridors.

The ERAP has been developed to cover a 15 year period to achieve the following outcomes:

- A stable and self-sustaining eco-system, comprised of predominantly native vegetation indigenous to the Sydney region, with a focus on adjacent coastal regions.
- An improvement in habitat opportunities and an increase in flora and fauna diversity.
- Alignment with relevant of Council adopted plans and strategies.
- Ability to be delivered in a cost efficient way.
- A working document that addresses the goals and objectives as outlined by Council staff, and Council's adopted plans and strategies.

For the purpose of this ERAP, the area to be managed by this plan is defined by the area shown in Figure 1. This ERAP clearly defines the roles and responsibilities of ongoing works, provides a timeline for completion of related works and outlines monitoring requirements for the ERAP area.

This ERAP herein provides controls and actions required to manage and restore the retained ecological features within the study area (the 'ERAP area') (Figure 1).

1.2 Description of study area

The study area is located approximately 8 kilometres south-east of the Sydney CBD.

The study area occurs within:

- Greater Sydney Local Land Services (LLS) Management Area
- Municipality of Waverley Council Local Government Area (LGA)

The study area is zoned RE1 Public Recreation and is surrounded by land zoned R3 Medium Density Residential with R4 High Density Residential to the south under the Waverley Local Environment Plan 2012 (WLEP 2012).

Figure 1: Location of the study area

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Scale 1:10,000 @ A4, GDA 1994 MGA Zone 56

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2 ERAP Scope and Objectives

2.1 Scope

The scope of this ERAP is to develop a framework for the long term management of vegetated portions of the council managed asset including the selected trees and vegetation to be retained/removed, and the ongoing management of weeds within the ERAP area. The ERAP will also outline ongoing management actions required for successful establishment of native plants within the ERAP area, and actions to protect the residing vegetation from future negative pressures.

The implementation of the ERAP will encompass a two stage establishment phase followed by a maintenance period (stage 3) that will run for a minimum of 2 years or until the objectives and performance criteria outlined in this ERAP are met.

This ERAP will also aim to guide the future management of the Council asset and will provide a set of clear objectives and performance criteria to assist in the ongoing management for an anticipated 15 year period.

2.1.1 Correlation with relevant Council documents and plans

To effectively deliver the proposed environmental outcomes, the ERAP aims to coordinate with the following aspects of the below listed Council adopted plans and strategies:

Waverley Council Local Environmental Plan 2012

Objectives of the plan:

- To enable land to be used for public open space or recreational purposes.
- To provide a range of recreational settings and activities and compatible land uses.
- To protect and enhance the natural environment for recreational purposes.
- To facilitate and manage public access to and along the coastline for all.

Plan of Management 2011 – 2021 (Waverly Council)

Suggested outcomes to include:

- Rainforest planting plan.
- A weed management strategy.

2.2 Objectives

The specific objectives for the implementation of this ERAP are to:

- Provide a description of the vegetation types and conditions and the environmental challenges that impact on biodiversity including the creation of management zones for specific strategic actions.
- Determine tabulated recommendations for specific management actions such as specifications for seed collection and plant sourcing, bushland regeneration activities, enhancement of fauna habitat including the identification of denning opportunities for hollow-dependent fauna.

- Provide information including specifications for revegetation activities including suggested plant species, plant sizes, installation densities, and strategic methods for the control of weed species based on density of infestations.
- The development of a monitoring, evaluation and reporting framework based on requirements that provide for all levels of legislative compliance as well as performance criteria, acceptable plant survival rates etc. for evaluating the success of ERAP implementation.

3 Methods

3.1 Desktop research and document review

A review of all available design plans and reports relating to the study area and adjacent areas was conducted, as well as relevant legislation, recent vegetation mapping and other documentation relevant to the current project, including;

- Previous flora and fauna records and vegetation mapping encompassing the study area, including:
  - Commonwealth Department of Environment and Energy (DEE) Protected Matters Search Tool.
  - NSW Office of Environment and Heritage (OEH) Atlas of NSW Wildlife.
  - Birds Australia database.
  - The Native Vegetation of the Sydney Metropolitan Area. Version 3. (OEH 2016).
- A review of all relevant documents associated with Thomas Hogan Reserve including :
  - Thomas Hogan Vegetation Management Plan (Anne Clements & Assoc, 2016).
    - Soil Assessment by Dr Pamela Hazelton.
    - Arboricultural Assessment by Russell Kingdom, Advanced Treescape Consulting.
  - Feature Survey of project site in PDF and DWG/DXF format.
  - Water-sensitive urban design (WSUD) Feasibility Assessments (McGregor Coxal 2018).
  - Letter of Objection – Prepared by Craig Anderson, Anderson Environment & Planning.(2017).
  - Letter of Objection – Prepared by Shaun King, Mara Consulting (2017).
- A review of LGA wide documents for relevance to Thomas Hogan Reserve:
  - Waverley Council Environmental Action Plan (2018) and supporting documents.
  - Waverley Local Environmental Plan 2012.
  - Waverley Council Biodiversity Study of Waverley Local Government Area, 2011.
  - Biodiversity Action Plans – Remnant Sites 2014 (Total Earth Care, 2014a).
  - Bronte Ecological Restoration and Action Plan (Total Earth Care, 2014b).
  - Thomas Hogan Reserve Plan of Management 2011.
  - Biodiversity Study of Waverley Local Government Area 2011
  - Habitat corridors map (Waverley Council 2012).
  - Waverley Weeds Action Plan (2012) to reduce/remove targeted weed species across the LGA
- NSW *Biosecurity Act 2015* (Biosecurity Act).

3.2 Site assessment

An ecological site survey of the study area was conducted on 3 October 2017 by a qualified and experienced Restoration Ecologist, Paul Price. The study area was surveyed using the random meander method (Cropper 1993). This involved:

- The identification of native and exotic plant species, according to *Field Guide to the Native Plants of Sydney* (Robinson 2003) and the *Flora of NSW* (Harden 1992, 1993, 2000, 2002), with reference to recent taxonomic changes.
- The identification and mapping of plant communities according to the structural definitions of Native Vegetation of the Sydney Metropolitan Area (OEH 2016).
- Targeted searches for plant species of conservation significance using the "random meander" method (Cropper 1993).
- Identifying fauna habitats, assessing their condition and assessing their value to threatened fauna species.
- Observations of animal activity and searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, scratches and diggings).
- An assessment of the natural resilience of the vegetation of the site.
- Identification of previous and current factors threatening the ecological function and survival of native vegetation within and adjacent to the study area.
- Determination of appropriate rehabilitation and bush regeneration techniques for the native vegetation of the site.

3.3 Limitations

Ecological surveys 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, seasonal conditions, ephemeral status of waterbodies and the migration and breeding behaviours of some fauna. In many cases these factors do not present a significant limitation to assessing the overall ecological values of a site.

4 Site description

4.1 Vegetation communities

The study area is a land locked Council managed asset surround by urban residential dwellings and high density housing. The bulk of the vegetation within the study area (and ERAP area) is deemed Urban/Exotic as a result of the high representation of the dominant canopy species of Camphor laurel *Cinnamomum camphora and* Coral tree *Erythrina x sykesii.* The mid storey stratum across the vegetated areas has been reduced to a collection of Palm species which have self-seeded throughout the reserve. The ground storey stratum was limited to exotic perennial grass and climber species such Palm Grass *Setaria palmifolia* and Morning Glory *Ipomoea indica*.

4.2 Fauna habitats

A range of fauna habitat features occur throughout the ERAP area, and habitat present provides potential foraging, breeding and nesting resources for a range of native and exotic species. Several hollow-bearing trees were recorded within the study area. The habitat features relevant to each fauna group are identified in Table 1 below.

Table 1 Key fauna habitat features present across the study area

Habitat features	Fauna species
Vegetated areas of tall exotic forested	Arboreal mammals, microchiropteran bats and owls.
Dead trees/Stags	Arboreal mammals, microchiropteran bats and birds.
Leaf litter/woody debris	Foraging resources for birds, mammals, frogs and reptiles.

4.3 Threatened species habitats

Threatened species habitat within the ERAP area is considered to be highly limited due to the past disturbance factors such as vegetation clearance, exotic species invasion and the close proximity to residential dwellings.

Review of the OEH Bionet Atlas (OEH 2018) and the DEE Protected Matters Search Tool (DEE 2018) found records of 30 threatened flora species and 48 threatened fauna species as previously recorded, or predicted to occur, within a five kilometre radius of the study area. Of these locally occurring threatened species the following are considered most likely to occur within the ERAP area:

- Eastern Bentwing-bat *Miniopterus schreibersii oceanensis* (Vulnerable, BC Act)
- Powerful Owl *Ninox strenua* (Vulnerable, BC Act)
- Southern Myotis *Myotis macropus* (Vulnerable, BC Act)
- Grey-headed Flying-fox *Pteropus poliocephalus* (Vulnerable EPBC Act and BC Act)

4.4 Exotic plant species

4.4.1 Priority weeds

Four plants listed as NSW Priority Weeds within the Waverley Council LGA under the Biosecurity Act 2015 were recorded within the ERAP area, and landowners and occupiers are under legal obligations to manage such species in line with the 'General Biosecurity Duty' which states;

> *All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.*

The four priority weed species are all also Weeds of National Significance (WoNS) (Table 2).

Table 2 Priority weeds and WoNS recorded within the study area

Scientific name	Common name	Biosecurity Act requirements	WoNS
Anredera cordifolia	Madeira vine	**Mandatory Measure** *Must not be imported into the State or sold* **General Biosecurity Duty** *Prevention of the species spread*	Yes
Asparagus aethiopicus	Ground asparagus	***Mandatory Measure*** *Must not be imported into the State or sold* **General Biosecurity Duty** *Prevention of the species spread*	Yes
Asparagus plumosus	Climbing asparagus	**Mandatory Measure** *Must not be imported into the State or sold* **General Biosecurity Duty** *Prevention of the species spread*	Yes
Lantana camara	Lantana	**Mandatory Measure** *Must not be imported into the State or sold* **Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land.* **General Biosecurity Duty** *Prevention of the species spread*	Yes

4.4.2 Environmental weed species

A wide variety of weed species were recorded within the ERAP area, many of which can be classified as being environmental weed species or garden escapees. The key biodiversity altering species for which were recorded with reserve include:

- Palm Grass *Setaria palmifolia*
- Asthma Weed *Parietaria judaica*
- Morning glory *Ipomea indica*
- Trad *Tradescantia fluminensis.*

It should be noted that under the Biosecurity Act 'General Biosecurity Duty' all plants that have the potential to cause a biodiversity impact (i.e. the spread of weeds) must be treated to prevent that risk from occurring.

5 Vegetation Management

5.1 General approach

This ERAP provides a prioritised succession of restoration works that have considered a long term commitment to biodiversity management. All proposed works within study area will provide scope for the creation of an urbanised habitat feature through the implementation of suggestions as made by Thomas Hogan Management Plan (WC2011).

5.1.1 Habitat features

The ERAP will aim to provide a range of fauna habitat features through its implementation. The features will look to provide potential foraging, breeding and nesting resources for a range of fauna. The habitat features relevant to each fauna group are to include:

- Increased occurrence of leaf litter/woody debris for foraging resources for birds, mammals, frogs and reptiles.
- Increased shrub and mid storey layers for birds, mammals

5.2 Vegetation management zones

The ecological assessment completed by Biosis (2018) in the preparation of this plan has been used to delineate the vegetation management zones to which this ERAP will apply. The delineation of vegetation management zones was determined based on various site attributes identified during the field investigation, including:

- Vegetation community type.
- Resilience within the overstorey, shrub storey and understorey.
- Level of recruitment of exotic species (including priority weeds).

Using these attributes, three vegetation management zones have been identified within the ERAP area (Figure 2). The location and extent of each zone is provided in Figure 2 with corresponding summary of the management requirements for each zone provided in Table 3 below.

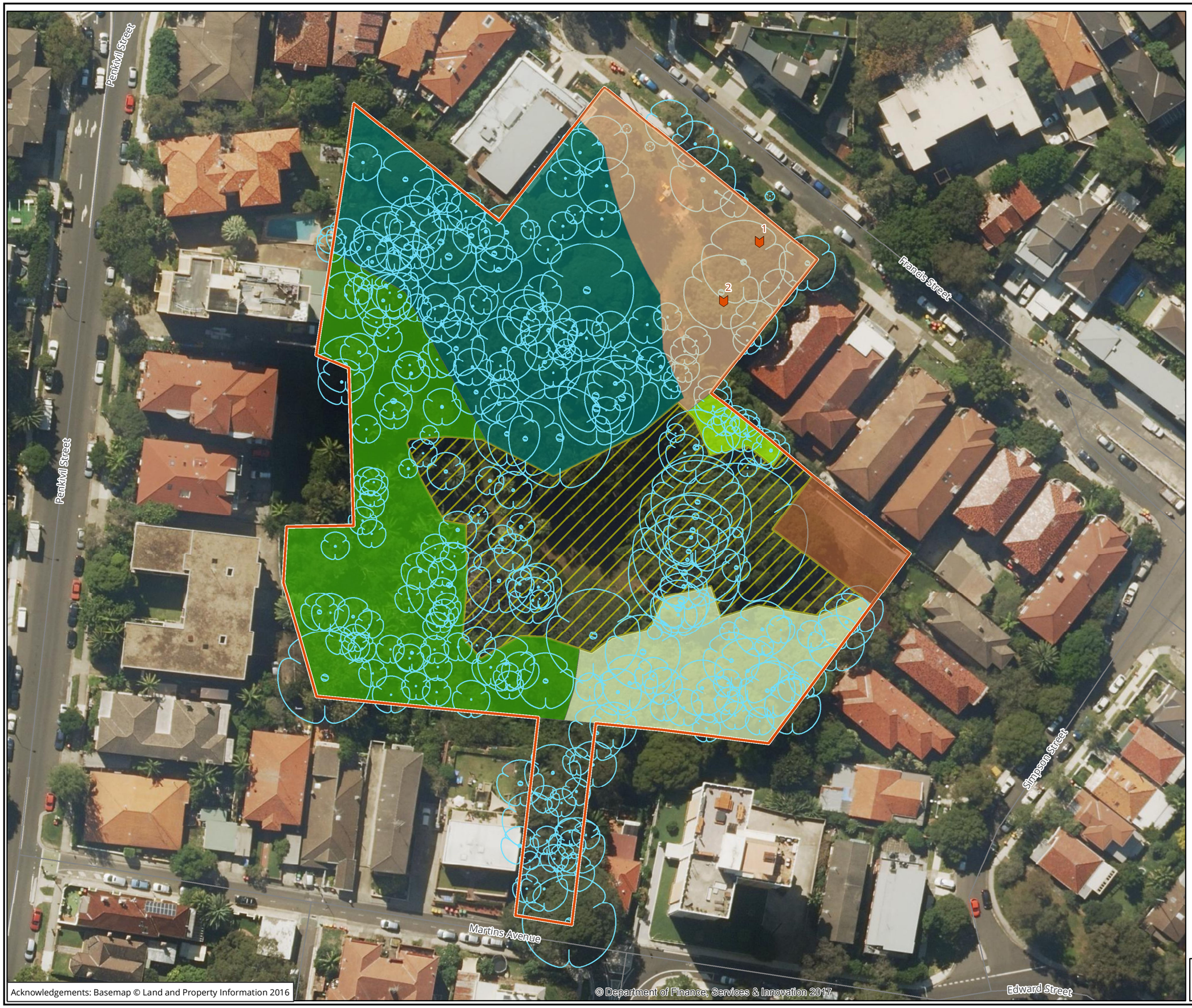
All other areas deemed as requiring ongoing management not compatible with ecological restoration (i.e. easements and services access) are not included within this ERAP.

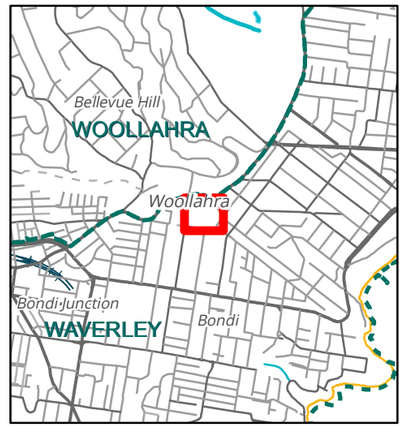
Table 3 Management zones

Management zone	Area	Description
Management Zone 1A: (MZ 1A)	0.19 hectares	MZ 1A is to be managed as a native /exotic specimen planting bed where an assortment of plants indigenous to the Waverley LGA will be intermixed with the currently residing ornamental herbaceous and perennial plants. Due to the sandy, apedal nature of the soil, plant species indicative to that of Plant Community Types (PCT) of : • PCT 1818: Coastal Sand Tea-tree - Banksia scrub; • PCT 1778 : Coastal Sand stone Foreshores Forest; • PCT 1828: Coastal Sand stone Gallery Rainforest.

Management zone	Area	Description
		A select number of species from the afore mentioned communities are to be selectively installed throughout the management zone (recommended species are outlined in Appendix 2). Additional activities to be undertaken within the zone will include : • Soil stabilisation e.g. coir logs, timber sleepers or site sourced logs (derived from tree felling) and/or jute matting product (620-650 gsm) in areas subject to surface erosion and instability. • Mulching of entire zone to improve the soil structure and water holding capacity, increase survival rates of newly planted specimens and act as weed suppressant. • Selective removal of accumulated biomass including palm fronds and branches. Leaf litter and suitable course woody debris is to remain in situ to act as additional erosion control measures. Due to the disturbed nature of the management zone, works will look to implement a full revegetation program.
Management Zone 1B: (MZ 1B)	0.01 hectares	MZ 1B is a continuation of MZ 1A within an adjacent established garden bed. Additional activities to be undertaken within the zone will include : • Mulching of entire zone to improve the soil structure and water holding capacity, increase survival rates of newly planted specimens and act as weed suppressant. Works within this management zone are to be undertaken in conjunction with any proposed park upgrades or planned civil works.
Management Zone 2: (MZ 2)	0.28 hectares	As a result of position and aspect, MZ 2 is to be managed as a native /exotic specimen planting bed with a strong focus on the installation of plant species indicative to that of the following PCT's : • 1832 Tuckeroo - Lilly Pilly - Cheese Tree littoral rainforest • PCT 1828 : Coastal Sand stone Gallery Rainforest Recommended species are outlined in Appendix 2. Additional activities to be undertaken within the zone will include: • Soil stabilisation e.g. coir logs, timber sleepers or site sourced logs (derived from tree felling) and/or jute matting product (620-650 gsm) in areas subject to surface erosion and instability. • Mulching of entire zone to improve the soil structure and water holding capacity, increase survival rates of newly planted specimens and act as weed suppressant. • Selective removal of larger accumulated biomass including palm fronds, and branches. Leaf litter and suitable course woody debris is to remain in situ to act as additional erosion control measures • Due to the disturbed nature of the management zone, works will look to implement a full revegetation program.
Management Zone 3:(MZ 3)	0.33 hectares	MZ 3 is to be managed as native /exotic specimen planting bed where an assortment of plants indigenous to the Waverley LGA will be intermixed with the currently residing ornamental herbaceous and perennial plants species. Due to the sandy, apedal nature of the soil, plant species indicative to that of the following PCT 's : • PCT 1818: Coastal Sand Tea-tree - Banksia scrub; • PCT 1778 : Coastal Sand stone Foreshores Forest; • PCT 1828 : Coastal Sand stone Gallery Rainforest A select number of species are to be selectively installed throughout the

Management zone	Area	Description
		management zone (recommended species are outlined in Appendix 2). Additional activities to be undertaken within the zone will include : • Soil stabilisation e.g. coir logs, timber sleepers or site sourced logs (derived from tree felling) and/or jute matting product (620-650 gsm) in areas subject to surface erosion and instability. • Mulching of entire zone to improve the soil structure and water holding capacity, increase survival rates of newly planted specimens and act as weed suppressant. • Selective removal of accumulated biomass including palm fronds, and branches. Leaf litter and suitable course woody debris is to remain in situ to act as additional erosion control measures. Due to the disturbed nature of the management zone, works will look to implement a full revegetation program.





Legend

- Study area
- Community hall
- Park/Playground
- Turfed area
- Hollow-bearing trees

Management zone

- 1A
- 1B
- 2
- 3

Figure 2: Management zones

0 10 20 30 40

Metres
Scale: 1:750 @ A3
Coordinate System: GDA 1994 MGA Zone 56

N

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6 Specific management actions

6.1 Site establishment

6.1.1 Tree and biomass removal

Prior to the commencement of any revegetation works, all tree deemed unsafe through the utilisation of the Safe Useful Life Expectancy' method (SULE) (Barrell 2009) are to be removed. Where applicable, site sourced logs (derived from tree felling) are to be placed in areas subject to surface erosion and instability.

Additional activities to be undertaken are to include the selective removal of accumulated biomass including palm fronds, and branches. Leaf litter and suitable course woody debris is to remain in situ to act as additional erosion control measures.

6.1.2 Vegetation exclusion fencing

To reduce the incidence of unauthorised access through revegetated sections and reduce the potential damage as a result of trampling, preventive exclusion fencing is to be installed at key unauthorised access points (to be determined by Council and the contractors implementing the ERAP). Choice of fencing is to be selected in conjunction with Council fencing style guides and chosen preferred suppliers for sourcing and installation.

Fencing types are to be chosen for installation are to complement the reserve features and align with the council asset's leafy outlook.

6.2 Restoration and rehabilitation

All bushland restoration and revegetation works are to be undertaken by a suitably qualified and experienced bush regeneration contractor where, as a minimum, staff are to have obtained a Certificate II in Conservation and Land Management (or equivalent).

To effectively deliver the ERAP, a three-staged program is to be implemented that will encompass a establishment phase (stages 1 and 2) and a two year maintenance phase (stage 3). It is anticipated that the establishment phase may take up to five years for its completion pending plant availability and rate of growth of planted specimens in management zones 1 and 3.

6.2.1 Stakeholder involvement

The successful delivery of the ERAP will require the assistance of a variety of stakeholders. A list of the major stakeholders and their associated tasks are provided as Table 4.

Table 4 Stakeholder involvement

Stakeholders	Associated tasks
Waverley Council Parks Operations and natural areas Staff	• Mowing all turfed areas (playground and lower level) to the edge bush shrub line. • Removal of palm fronds from areas with $<25^0$ slope or that can be reached from a flat surface. • Maintain formal garden beds. • Tidy and clean turfed areas, stairs, paths, furniture and playground of litter and fallen debris.

Stakeholders	Associated tasks
	• Seasonal turf improvement amendments such as fertilising, aerating, wetting agent and herbicide for Bindii and Broadleaf weed species. • Provide support for volunteer based activities within the reserve.
Council preferred supplier : Bush Regeneration Contractor)	• Implementation of staged ERAP under the direction of Waverley Council staff. • Plant supply and install. • Application of industry approved methods for weed control and soil stabilisation.
Waverley Council Bushcare/ Proposed Friends of Thomas Hogan Reserve	• Provide ongoing support and care in the maintenance of the Council asset. Activities may include planting, mulching and weed control. • Seed collection. • Monitor for both exotic and native fauna species.

6.2.2 Stage 1

Stage 1 works will aim to provide for the site establishment and all preliminary works associated with the delivery of the ERAP. Activities will also include the commencement of restoration works within management zones MZ 1 and MZ 3. Activities to be undertaken within stage 1 are to include:

- Seed collection and propagation requirements.
- Selective tree removal.
- Install exclusion and directional fencing and edging.
- Weed control (primary and secondary).
- Site preparation, mulching /jute matting and revegetation.
- Commencement of a weed control and revegetation maintenance program.

Specifications and their associated performance criteria for stage 1 are provided as Table 5

6.2.3 Stage 2

Stage 2 works will include the commencement of restoration works within management zone MZ 2, with the inclusion of maintenance activities within MZ 1 and MZ 3. Activities to be undertaken within stage 2 are to include:

- Continued weed and revegetation maintenance of MZ 1 and MZ 3.
- Weed control (primary and secondary) within MZ 2.
- Site preparation, mulching /jute matting and revegetation of MZ 2.

Specifications and their associated performance criteria for stage 2 are provided as Table 6

Stage 3
Stage 3 works will look to commence the two year maintenance period with all management zones. Activities to be undertaken within stage 3 are to include:

- Weed control maintenance.
- Revegetation maintenance.

Specifications and their associated performance criteria for stage 3 are provided as Table 7.

6.3 Ongoing site management

Upon the completion of both the establishment phase (stages 1 and 2) and the two year maintenance period (stage 3), activities will aim to increase and maintain the mid and ground story stratums whilst maintaining a relatively weed free environment. Activities to be undertaken as a part of the ongoing management of the ERAP area are to include :

- Weed control maintenance include the re-application of mulch as required.
- Revegetation maintenance and supplementary revegetation.
- Removal of palm derived biomass.
- Maintenance of all erosion control measures and fencing / edging.

Specifications and their associated performance criteria for the ongoing management of the ERAP area are provided as Table 8.

Table 5 management actions (estbalishment phase) and performance criteria

Management Action	Management Zone	Responsibility	Task / Performance Criteria	Timing
Seed collection and propagation requirements	All zones	Restoration ecologist / Waverley Council (WC) project manager / Bushcare and volunteer groups	The collection/sourcing of local native species (seeds and tubestock) in preparation for the proposed ERAP vegetation management actions. Vegetation communities targeted for collection are to include • *Coastal Sand Tea-tree - Banksia scrub;* MZ 1 and MZ 3 • *Coastal Sand stone Foreshores Forest;* MZ 1 and MZ 3 • *Coastal Sand stone Gallery Rainforest* for MZ 1 and MZ 3. • *Tuckeroo - Lilly Pilly - Cheese Tree littoral rainforest* species for MZ 2. Densities and numbers are provided with Table 5 Species list per zone is provided as Appendix 2, Table 12.	Collection/sourcing is to occur over the duration of the project. A minimum lead time of **12 months** is required prior to the commencement of the project. Activity undertaken in conjunction with availability of plants and completion of staged weed removal and ongoing plant replacement.
Selective tree removal	All zones	WC project manager / WC appointed arborist	Selective removal of trees deemed unsafe as with a SULE rating of 4. Additional activities are to include the selective removal of exotic woody tree and palm species < 150mm Diametre Breast Height (BDH). Palm species such as Bangalow Palm *Archontophoenix cunninghamiana* are to be retained within the study area.	Prior to the commencement of any weed control, site preparation and revegetation activities. Estimated time frame associated with the tree removal : **1 month**
Install exclusion and directional fencing and edging	All zones	WC project manager /WC appointed construction contractor	Installation of directional fencing on vegetation/grassed interface and on urban boundary with scope to elimination authorised track creation within the study area. Vegetation exclusion fencing is to be installed as per the specifications above Section 6.1.2.	Prior to vegetation removal and during earthworks. To be undertaken in coordination with the plant sourcing lead time. Estimated installation time

Management Action	Management Zone	Responsibility	Task / Performance Criteria	Timing
				period : **1 month**
Weed control (primary and secondary)	MZ 1 and MZ 3	Bush regeneration (BR) contractor/ Bushcare and volunteer groups.	Primary and secondary weed control works are to include the following actions: • All priority, environmental, vine and woody weeds within the ERAP area are to undergo treatment as per the staged program as provided in section 6. • All weeds treated as per Appendix 1. Weed treatment Table 11 • All mature priority weeds are to be successfully treated within the ERAP area prior to commencement of the maintenance period. • All rubbish is to be removed. • Selective removal of larger accumulated biomass including palm fronds, and branches. Leaf litter and suitable course woody debris is to remain in situ to act as additional erosion control measures. Works are to include the retention of all non-invasive exotics and introduced natives that have established within the zone with scope to maintain the reserves current leafy outlook. Species to be retained are to include *Clivia miniata,* Bangalow Palm, Illawarra Flame tree *Brachychiton acerifolius* (seedlings included) and Bamboo *Bambusa sp*. Keystone weed species to be targeted with the management zones are to include (but not limited to) : • Madeira Vine *Anredera cordifolia* • Palm Grass *Setaria palmifolia* • Asthma Weed *Parietaria judaica* • Morning glory *Ipomea spp*. • *Tradescantia fluminensis.*	From the outset of vegetation management program. **MZ 1 estimated time frames:** • Primary weed control : 2 Months • Resources: team of four (BR), once a fortnight. • Secondary weed control : 6 months • Resources: team of four (BR), once a fortnight. **MZ 2 estimated time frames:** • Primary weed control : 2 Months • Resources: team of four (BR), once a week. • Secondary weed control : 8 months • Resources: team of four (BR), once a fortnight.
Site preparation	MZ 1and MZ 3	BR contractor/ Bushcare and	Site preparation of the management zones is to include : • Stabilisation of planted areas to with site derived logs and coir logs.	Immediately following successful completion of

Management Action	Management Zone	Responsibility	Task / Performance Criteria	Timing
		volunteer groups		secondary weed control. **Estimated time frames: 1 month** (time frame depended on areas requiring stabilisation works).
Revegetation	MZ 1and MZ 3	BR contractor/ Bushcare and volunteer groups.	Revegetation works are to comprise: • Plants installed as per densities as provided in Table 9. • A minimum of 85% survivorship of all planted specimens is to be maintained over the duration of the ERAP implementation. • Species are to be utilised for revegetation purposes are to be chosen for the list provided as Appendix 3 Table 13. Any replacement planting is to occur within the 2 year maintenance phase (stage 3). • Installation of mulch to a depth of 75 millimetres around each planted specimen over the entirety of the management zone. Contractors are to adhere to the mulch source and supply specification as provided in section 6.4.3.	Immediately following successful completion of site preparation. **MZ 1 estimated time frames : 1 month** (Time frame dependent on plant availability and suitable climatic conditions).
Weed control maintenance	MZ 1and MZ 3	BR contractor/ Bushcare and volunteer groups.	Weed control maintenance activities are to comprise: • All mature NSW Priority Weed species are to be successfully treated prior to commencement of maintenance period. • Seedlings of priority species are to be continually suppressed to a level of <5% Projected Foliage Cover (PFC) where they occur in the seed bank below mature specimens, and <1% PFC across remainder of the ERAP area. • Works to be undertaken utilising best practice bush regeneration techniques.	The stage 1 weed control maintenance period duration will cease on the completion of stage 2 objectives. Commencement and completion dates of the maintenance period will be determined by the Project Restoration Ecologist, following consultation with

Management Action	Management Zone	Responsibility	Task / Performance Criteria	Timing
				Council. **MZ 1 estimated time frames:** • Maintenance weed control : 12 Months • Resources: team of four (BR), once a month (Frequency assumes the establishment of the volunteer group)

Table 6 Stage 2 management actions (establishment phase) and performance criteria

Management Action	Management Zone	Responsibility	Task / Performance Criteria	Timing
Weed control (primary and secondary)	MZ 2	BR contractor / WC resourcing and or staff/ Bushcare and volunteer groups	Primary and secondary weed control works are to include the following actions: • All priority, environmental, vine and woody weeds within the ERAP area are to undergo treatment as per the staged program as provided in section 6. • All weeds treated as per Appendix 2. Weed treatment table. • All mature NSW Priority Weed species are to be successfully treated within the ERAP area prior to commencement of the maintenance period. • All rubbish is to be removed. • Selective removal of larger accumulated biomass including palm fronds, and branches. Leaf litter and suitable course woody debris is to remain in situ to act as additional erosion control measures. Works are to include the retention of all non-invasive exotics established within the zone with scope to maintain the reserves current leafy outlook. Species to be retained are to include *Clivia miniata,* Bangalow Palm, Illawarra Flame tree *Brachychiton acerifolius* (seedlings included) and Bamboo *Bambusa sp*. Keystone weed species to be targeted with the management zones are to include (but not limited to) : • Madeira Vine *Anredera cordifolia.* • Palm Grass *Setaria palmifolia.* • Asthma Weed *Parietaria Judaica.* • Morning glory *Ipomea spp*. • *Tradescantia fluminensis.*	At the completion of the stage 1 revegetation works (within MZ1 and MZ 3). **MZ 2 estimated time frames:** • Primary weed control : 3 Months • Resources: team of four (BR), once a fortnight. • Secondary weed control : 8 months • Resources: team of four (BR), once a fortnight.

Management Action	Management Zone	Responsibility	Task / Performance Criteria	Timing
			Works will aim to highlight the sandstone features of the management zone and prepare for future revegetation works.	
Site preparation	MZ 2	BR contractor/ Bushcare and volunteer groups	Site preparation of the management zones is to include : • Weed treatment prior to mulch installation. • Stabilisation of planted areas to with site derived logs and coir logs.	Immediately following successful completion of secondary weed control (MZ 2). **Estimated time frames: 1 month** (time frame depended on areas requiring stabilisation works).
Revegetation	MZ 2	BR contractor/ Bushcare and volunteer groups.	Revegetation works are to comprise: • Plants installed as per densities as provided in Table 9A minimum of 85% survivorship of all planted specimens is to be maintained over the duration of the ERAP implementation. • Species are to be utilised for revegetation purposes are to be chosen for the list provided as Appendix 2 Table 13. • Installation of mulch to a depth of 75 millimetres around each planted specimen. • Contractors are to adhere to the mulch source and supply specification as provided in section 6.4.3 Any replacement planting is to occur within the 2 year maintenance phase (stage 3).	Immediately following successful completion of the site preparation (MZ 2). **Estimated time frames : 1 month** (Time frame dependent on plant availability and suitable climatic conditions).

Table 7 Stage 3 management actions (maintenace phase) and performance criteria

Management Action	Management Zone	Responsibility	Task / Performance Criteria	Timing
Weed control maintenance	All zones	BR contractor / WC resourcing and staff/ Bushcare and volunteer groups.	Maintenance weed control activities are to comprise: • Seedlings of priority species are to be continually suppressed to a level of <5% PFC where they occur in the seed bank below mature specimens, and <1% PFC across remainder of the ERAP area. • Works to be undertaken utilising best practice bush regeneration techniques. • Less than 5% exotic species PFC to be achieved over the entire ERAP area after 12 months of maintenance works. • Continual suppression at <5% for the remaining 12 months of the maintenance period (24 month total maintenance period).	Stage 3 maintenance works will commence at the completion of stage 2 objectives. Stage 3 is to be delivered over a two year period. Completion of the maintenance period will be **following 24 months from the commencement date** and when the Performance Criteria (adjacent) have been achieved. **Resources: team of four (BR), once a month.** (Frequency assumes the establishment of the volunteer group)**.**
Revegetation maintenance	All zones	BR contractor / WC resourcing and staff/ Bushcare and volunteer groups.	Revegetation maintenance activities are to comprise: • Installed plantings are to be maintained with key elements of water, prevention of predation and suppression of smothering weeds. • A minimum of 85% survivorship for each species is to be maintained to the end of ERAP implementation. • Replacement planting is to be carried out throughout the maintenance period to sustain the 85% survival rate at the completion of the maintenance period.	Watering visits to continue as required to plant establishment. Re-installation of plantings to occur as required. Completion of the maintenance period will be following 24 months from the commencement date

			• Losses of greater than 15% of originally installed plantings may have the maintenance period extended until survival rates have been achieved.	and when the Performance Criteria have been achieved. **Resources including in previous action.**

Table 8 Ongoing maintenance

Management Action	Management Zone	Responsibility	Task / Performance Criteria	Timing
Weed control maintenance	All zones	BR contractor / WC resourcing and staff/ Bushcare and volunteer groups.	Weed control maintenance activities to comprise: • Seedlings of priority and keystone weed species are to be continually suppressed to a level of <5% PFC. • Works to be undertaken utilising best practice bush regeneration techniques. • Continual suppression at <5% FPC for the duration of the ERAP. • Continual suppression of self-seeding exotic tree and palm species.	Ongoing. **Estimated time frames:** • Resources: team of four (BR), once every 6 weeks. (Frequency assumes the establishment of the volunteer group)
Revegetation maintenance	All zones	BR contractor / WC resourcing and staff/ Bushcare and volunteer groups.	Revegetation maintenance activities are to comprise: • Continued replacement planting is to be carried out throughout the duration of the ERAP. • Losses of greater than 15% of originally installed plantings may have the maintenance period extended until survival rates have been achieved.	Watering visits to continue as required to plant establishment. **Estimated timeframes and resources included in previous action.**
Additional maintenance activities	All zones	BR contractor / WC resourcing and staff/ Bushcare and volunteer groups.	Additional maintenance activities are to comprise: • Removal of palm fronds and accumulated biomass where impeding growth of planted specimens. • Mulching and maintenance of erosion/soil stability control measures.	Ongoing. **Estimated timeframes and resources included in previous action.**

6.3.1 Seed collection, propagation and plant sourcing

Time should be allocated to seed collection, propagation and plant sourcing to allow for seasonal variations in seed production. Depending on timing, this may include collecting seed up to 24 months in advance of revegetation works.

Seed collection is to be carried out in accordance with the Florabank Guidelines, by experienced and licenced seed collectors.

6.3.2 Weed management

Environmental weeds are exotic species considered either a high risk of dispersing and becoming established in adjacent native vegetation, or have the potential to cause significant ecological harm. Recommended methods for control of environmental weeds recorded on site, along with priority species, are outlined in Appendix 1.

6.4 Revegetation

The purpose of revegetation for this project includes:

- The promotion of a structurally diverse vegetative community to create a modified bushland environment and habitat features.
- Reducing the incidence of surface erosion.
- Creating or maintaining habitat corridors to help facilitate the movement of flora and fauna species.

All plants are to be installed as part of the required revegetation works are to be either as forestry tubes, hikos and/or enviro-cells sized pots (dependent on species to be installed). A recommended species list per stratum is provided as Appendix 2. The recommended planting list is based on species that are characteristic of vegetation communities for which occur within the Sydney basin's coastal bioregion.

6.4.1 Planting densities

To effectively create a suitable ground, lower-mid and upper-mid storey and canopy stratums, a full revegetation treatment is will be required utilising the following densities:

- Trees are be installed at a rate of 1 plant/ 20 square metres.
- Tall shrubs/small trees at a rate 1 plant/ 5 square metre.
- Shrubs at a rate 1 plant/ 2 square metre.
- Sedges/grasses and herbs/forbs (ground covers) installed at a rate of 3 plants per square metre.

Plants are to be installed at the number as provided in Table 9.

Table 9 Planting number / densities

Zone	Trees	Tall shrubs/small trees	Shrubs	Ground covers/grasses	Total
Zone 1	100	400	1000	6000	7500
Zone 2	75	300	750	4500	5625
Zone 3	165	660	1650	9900	12375
Total	340	1360	3400	20400	25500

An estimated 25,550 plants are to be installed as part of the proposed ERAP works. In the event of plant loss, a nominated replacement of 10% of the total plants installed (2555) has been calculated to ensure potential re-planting to maintain 85% survival rates has been captured.

6.4.2 Soil conditioner and additives

At the time of planting, fertiliser is be applied to each plant in the form of a native slow release product with an N: P: K ratio of similar to that of 21.8: 0.7: 7.2. This will reduce the incidence of 'Nitrogen draw down' when planting in mulched areas.

Water crystals may also be used to reduce the incidence of death amongst establishing plants. Such an additive will also reduce initial water costs during the establishment phase of the ERAP implementation.

6.4.3 Mulch

Mulch is to be either of eucalypt wood or leaf chip derived source (not 'tub ground') and preferably chipped from parent material within a 10 kilometre range of the ERAP area to ensure any potential tree seeds are compatible with the corresponding vegetative communities. Mulch is not to contain any chipped Pine, Coral tree, Palm (or any exotic species propagules) and is not to contain the remnants of recycled wood products such as pallets.

6.4.4 Watering

Watering of newly planted stock will be undertaken to ensure that an adequate survival and establishment rate is achieved. Watering is to abide by any local authority water restrictions or guidelines. To assist in this process, a soil wetting agent such as Hydrocell®, or similar approved product, may be applied into each planting hole to maximise water retention around the root ball during the establishment period.

Watering of all stock will occur at the time of the planting, to minimise shock on the tubestock in their new conditions. Further watering will be on an "as required" basis to ensure compliance with the allocated performance criteria.

Watering will generally be carried out in the cooler hours of the day (morning or afternoon), and will be frequent enough to prevent wilting of plants. Tubestock is to be watered prior to planting as well as immediately after planting installation.

Planting areas are to be monitored during the extended maintenance period to ensure that climatic conditions are not affecting any newly planted tube stock. If climate or environmental conditions are affecting

the tube stock a watering program may be reinstated pending the approval by the Council environmental manager.

6.5 Maintenance

Long term site maintenance works will commence following the completion of the stage 3 maintenance weed control and supplementary revegetation activities, and will continue for anticipated period of 15 years. It is anticipated that the maintenance activities will occur monthly during cooler months and bi-monthly in the warmer months. Required works and indicative effort are outlined in Table 10.

Table 10 Indicative extended maintenance period works summary

Maintenance Activity	Minimum Effort	Frequency	Responsibility
Spot spraying of annual and perennial weeds	Two person days	Monthly in cooler months, fortnightly in warmer months	BR contractor / WC resourcing and staff
Watering	As required	Only during excessively hot periods of summer	BR contractor / WC resourcing and staff
Replacement planting of tubestock	As required	Annual checks and planting	BR contractor / WC resourcing and staff

7 Monitoring

To gauge the effectiveness of the ERAP a monitoring program is to be undertaken by the Project Restoration Ecologist / WC officer. Monitoring surveys will assess the success of weed removal and plant growth.

Monitoring surveys will assess the success of weed removal and plant growth and will be undertaken as follows:

- Prior to commencement of works to gather baseline data.
- Followed by a survey every six months to gather ecological monitoring data on the progress of the project, with a final survey and report at the completion of stage 3. Each six month survey should be accompanied by brief correspondence with the BR contractor and the proponent / project manager regarding the progress of the vegetation management works, and highlight any areas of concern / merit.
- Achievement of performance criteria will be updated in each preceding report as milestones are achieved.

These reports are to be submitted to Council.

Monitoring activities are to include:

- Establishing a minimum of two photo-points in representative locations.
- Compile initial and on-going weed density maps.
- Assessment of weed control works including priority and woody weed control, and weed density surrounding plantings, via monitoring techniques such as weed density mapping, and quadrat / transect surveys.
- Identification and assessment of any natural regeneration of native plant species.
- Assessment of the success rate of plantings and assessment of plant replacement requirements, and convey any need to BR contractor.
- Assessment of the site for evidence of predation and erosion
- Establishment of a Fauna monitoring program.

8 Adaptive Management

An adaptive management approach is to be employed in respect of the works forming part of this ERAP. An adaptive management approach involves an integrated process of monitoring, reviewing and then responding to the health and condition of the plantings as well as the status of the weed species to identify any alterations to the design and maintenance of works that may be required to ensure the objectives of the ERAP are achieved.

For example, the application rates for fertiliser and the watering schedule should be flexible in responding to the health and vigour of the plantings and changing climatic conditions. Monitoring the plantings will also allow for a review of the selected species to enable changes in the species composition of the supplementary planting if it is determined that a particular species or stock sourced from a certain location is not performing adequately. The supplementary planting species, planting densities and planting patterns nominated within this ERAP may be subject to change and review if certain species are unavailable or are performing inadequately. The weed control works are also to be reviewed and appropriate changes implemented accordingly, if required. By example, if the nominated weed suppression schedule is not achieving the Performance Indicators specified, the frequency of weed suppression activities should be increased accordingly.

The requirement for adaptive management will be informed by the results of the monitoring assessment and on an on-going basis by the contractor charged with implementing the ERAP.

It is important to note that any changes should comply with the aims of this ERAP and any licensing or approval conditions issued before implementation.

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Waverley Council 2012. Habitat corridors map

Appendices

Appendix 1 Weed management measures

Standard methods

General weed management measures that should be undertaken prior to and during revegetation works include:

- Use a range of weed management methods such as :
  - Mechanical digging.
  - Manual removal
  - Herbicide application i.e. spot spraying, cut and paint techniques.
- Mow/slash areas infested with weeds before they seed (avoiding native vegetation).
- Employ appropriate vehicle hygiene such as:
  - Clean machinery, vehicles and footwear before moving to a new location.
  - Securely cover loads of weed contaminated material.
  - Dispose of weed contaminated soil at an appropriate waste management facility.
  - Remove weeds immediately and dispose of without stockpiling.
  - Separate weeds from native vegetation to be mulched – do not use weeds for mulch.
  - Minimise soil disturbance in weed infested areas.

Weed control methods adopted in the implementation of this ERAP are based on a combination of the current site management, bush regeneration industry standards and botanical knowledge of the weeds. Techniques and methods recommended in following sections such as 'hand weeding' are described in detail in various publications such as *Recovering Bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland.* (DEC 2005). The publication *Noxious and Environmental Weed Control Handbook. A Guide to Weed Control in Non-crop, Aquatic and Bushland Situations, 5th Edition* (DPI, 2011) provides descriptions on general and standard weed control methods.

Application of herbicide during weed control works will depend on species targeted and the growing situation. For example the selection of a herbicide and the application method for a particular species or class of plant will be determined by factors such as the degree of infestation of target species, limiting damage to off target native flora and preventing herbicides entering waterways. The DPI (2011) document cited above should be referred to as guide for specific herbicides, record keeping and herbicide application techniques.

Use of herbicides must be according to the NSW *Pesticides Act 1999*, Material Safety Data Sheets and labelling instructions for specific trade name herbicides and off label use permits registered with the APVMA. The use of herbicide as part of this ERAP will be limited to direct application to cut stumps and spot spraying. Any contractors using herbicides on the site must be trained and appropriately qualified to do so (ChemCert Level 2 or equivalent for subordinates and ChemCert Level 3 or equivalent for supervisors).

Slashing can be used to prevent weeds from flowering and setting seed. This method can be undertaken with a tractor and slashing implement or by using a hand held brush cutter (DPI, 2011). In addition DEC (2005) have highlighted that slashing or mowing can also be used in bushland areas (with grassy native understorey) as an initial or holding treatment to reduce weed mass. This allows for more efficient follow up as fast growing reshooting weeds can be spot sprayed with herbicide among areas of native grasses and herbs.

Species specific control for priority and environmental weeds recorded within the ERAP area are provided in Table 11.

Table 11 Priority and environmental weed management measures

Botanical name	Common name	Initial treatment	Follow up control
Annual weed species	Various	Hand remove Or chemically treat (spray) deseeded mature specimens with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water (1:100)	Monitor for seedlings. Hand remove and/or remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water
Acetosa sagittata	Turkey Rhubarb	Seeds to be bagged and removed from site. Hand removal all underground tubers. Chemically treat (spray) using a 333g/L Fluroxypyr based product at a dilution rate of 300 to 600 ml per 100 L water Or with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Ageratina adenophora	Crofton Weed	Cut and paint stems with 'neat' 360g/L Glyphosate based herbicide to reduce collateral damage to natives and riparian areas Or Chemically treat (spray) deseeded mature specimens with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water (1:100)	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water prior to flowering. A DPI approved biocontrol (Rust) may be applied to assist in control of large and remote locations.
Ageratina riparia	Mistflower	Cut and paint stems with 'neat' 360g/L Glyphosate based herbicide to reduce collateral damage to natives and riparian areas Or chemically treat (spray) deseeded mature specimens with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water (1:100)	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water
Anredera cordifolia	Madeira Vine	Hand removal all aerial and underground tubers. Biomass to be removed from site. Chemically treat (spray) using a Fluroxypyr 200 g/L based product at a dilution rate of 300 to 500 ml per 100 L water Or with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water

Botanical name	Common name	Initial treatment	Follow up control
Araujia sericifera	Moth Plant	Hand remove Or chemically treat (spray) deseeded mature specimens with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water (1:100). May require the use of a penetrant for effective kill rate. Fruits to be disposed off-site	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water
Asparagus spp.	Ground Asparagus Fern, Climbing Asparagus Fern.	Hand remove in area of high regeneration potential ensure that all fruiting bodies and central 'rhizome' has been removed and disposed off-site. Aerial tubers do not require removal and can act as a preventative measure against soil erosion. Large infestations to be chemically treated (spray) with a Metsulfuron-methyl 600 g/kg based herbicide at a diluted rate of 1 –2 g per 10 L of water plus a non-ionic surfactant. As per APVMA approved Offlabel permit PER9907	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water. All seeds and biomass are to be disposed off-site.
Bidens pilosa	Cobblers Pegs	Hand remove Or chemically treat (spray) deseeded mature specimens with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water (1:100)	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Cinnamomum camphora	Camphor Laurel	Cut/paint, Fill/drill and apply 'neat' 360g/L Glyphosate based herbicide.	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Chlorophytum comosum	Spider plant	Hand remove deseeded mature specimens all biomass is to disposed off-site	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water
Conyza bonariensis	Fleabane	Hand remove in area of high regeneration potential. Flowers and seeds to be removed and disposed of site. Remaining biomass can be composted on site on. Larger infestations can be chemically treated using a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water. Treatment prior to flowering to reduce seed set is recommended.	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.

Botanical name	Common name	Initial treatment	Follow up control
Hedera helix	English Ivy	Cut/paint, apply 'neat' 360g/L Glyphosate based herbicide to the base of plants. Biomass can either be removed form site or left on trees as habitat features. Lateral runners can be hand removed or scaped and painted with a 'neat 'neat' 360g/L Glyphosate based herbicide	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Ipomoea spp	Morning Glory	Hand remove in area of high regeneration potential. Biomass is to be removed and disposed of site. Larger infestations can be chemically treated using a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water. Stems can be scaped and painted with a 'neat 'neat' 360g/L Glyphosate based herbicide.	Hand remove seedlings/lateral runners or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Lantana camara	Lantana	Small to isolated infestations: Hand remove or Cut and paint stems with 'neat' 360g/L Glyphosate based herbicide in areas of high regeneration potential. Large infestations: can be cleared/treated in a mosaic pattern to reduce impacts to wildlife and the incidence of mass germination of secondary weed species. Can be chemically treated (foliage spray) via the use of a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water or a broadleaf selective herbicide such as a Metsulfuron-methyl 600 g/kg based herbicide.	Hand remove seedlings/shooting nodes or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Ligustrum lucidum	Broad-leaved Privet	Cut/paint, Fill/drill and apply 'neat' 360g/L Glyphosate based herbicide during growing season.	Hand remove seedlings/shooting nodes or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.

Botanical name	Common name	Initial treatment	Follow up control
Ligustrum sinense	Small Leaf privet	Cut/paint, Fill/drill and apply 'neat' 360g/L Glyphosate based herbicide during growing season. Larger specimens may produce vegetative suckers in response treatments.	Hand remove seedlings/shooting nodes or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Nephrolepis cordifolia	Fishbone Fern	Hand remove where applicable ensuring bulk of the root system and the associated water tubers are removed. Can be chemically treated via the application of a mixture of a Glyphosate 360g/L and Metsulfuron-methyl 600 g/kg based herbicides at a dilution rate of 200 mL glyphosate plus 1.5 g Metsulfuron methyl per 10 L of water	Hand remove seedlings/shooting nodes or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Ochna serrulata	Ochna, Mickey Mouse Bush	Small specimens may be manually removed. Established specimens can be either scaped/ painted using a 'neat' Glyphosate 360g/L based product or foliage spray using of a Glyphosate 360g/L and Metsulfuron-methyl 600 g/kg based herbicides at a dilution rate of 200 mL glyphosate plus 1.5 g Metsulfuron methyl per 10 L of water (Offlabel permit : PER9907).	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Parietaria judaica	Pellitory	Hand remove in area of high regeneration potential. Biomass is to be removed and disposed of site. Larger infestations can be chemically treated using a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water. Stems can be cut and painted with a 'neat 'neat' 360g/L Glyphosate based herbicide.	Hand remove seedlings/shooting nodes or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Phoenix canariensis	Pheonix Palm	Hand remove small specimens. Larger individuals are to be cut off at the base. All biomass is to be removed	Hand remove seedlings/shooting nodes or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.

Botanical name	Common name	Initial treatment	Follow up control
Senna pendula	Cassia	Cut/paint, scrape/paint and apply 'neat' 360g/L Glyphosate based herbicide to actively growing stems in areas of in areas of high regeneration potential (Off label permit : PER9907).	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litre of water.
Sida rhombifolia	Paddy's Lucerne, Common Sida	Cut/paint, scrape/paint and apply 'neat' 360g/L Glyphosate based herbicide to actively growing stems in areas of in areas of high regeneration potential (Off label permit : PER9907). Spot spray with a with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.
Tradescantia fluminensis	Trad	Manually remove in areas of in areas of high regeneration potential Or chemically treat with (adjacent to waterways and creek lines) a 360g/L Glyphosate based herbicide (Off label permit: PER9907) at a diluted rate of 200ml in Litres of water.	Hand remove seedlings or spot spray with a 360g/L Glyphosate based herbicide at a diluted rate of 10ml/Litres of water.

Appendix 2 Recommended planting species list

Table 12 Recommended species planting list for Management zones 1 and 3

Botanical name	Common name
Trees (10 -20 +m)	
Banksia integrifolia	Coastal Banksia
Cupaniopsis anacardioides	Broad-leaved apple
Small Trees (5- 10 m)	
Banksia ericifolia	Heath-leaved Banksia
Notelaea longifolia	*Native Olive*
Pittosporum undulatum	Sweet Pittosporum
Myrsine variabilis	Mutton wood
Shrubs	
Acacia longifolia	Sydney Golden wattle
Baeckea imbricata	Heath myrtle
Correa alba	White Correa
Correa reflexa	Native Fuchsia
Breynia oblongifolia	Coffee bush
Leucopogon parviflorus	Coastal Beard-heath
Melaleuca hypericifolia	Hillock Bush
Pimelea linifolia	Slender Rice Flower
Ground covers	
Actinotus helianthi	Flannel Flower
Centella asiatica	Centella
Commelina cyanea	Scurvy Weed
Imperata cylindrica	Blady Grass
Lomandra longifolia	Spiny-headed mat-rush
Plectranthus parviflorus	Cockspur flower
Pratia purpurascens	Whiteroot
Cymbopogon refractus	Barbed Wire Grass
Dichelachne micrantha	Shorthair Plumegrass

Echinopogon caespitosus var. *caespitosus*	Hedgehog Grass
Pelargonium australe	Native Geranium
Microlaena stipoides var. *stipoides*	Weeping grass
Themeda triandra	Kangaroo Grass
Viola hederacea	Native Violet

Table 13 Recommended species planting list for Management zone 2

Botanical name	Common name
Trees (10 -20 +m)	
Cupaniopsis anacardioides	Tuckeroo
Syzygium paniculatum	Magenta Lilly Pilly
Small Trees (5- 10 m)	
Acmena smithii	Lilly Pilly
Elaeocarpus reticulatus	Blue Berry Ash
Celtis paniculata	Native celtis
Glochidion ferdinandi	Cheese Tree
Ficus coronata	Sandpaper Fig
Pittosporum undulatum	Sweet Pittosporum
Shrubs	
Clerodendrum tomentosum	Hairy Clerodendrum
Notelaea longifolia	Native Olive
Synoum glandulosum	Scentless Rosewood
Ground covers	
Centella asiatica	Centella
Commelina cyanea	Scurvy Weed
Blechnum neohollandicum	Rasp Fern
Lomandra longifolia	Spiny-headed mat-rush
Plectranthus parviflorus	Cockspur flower
Pratia purpurascens	Whiteroot
Oplismenus imbecillis	Basket Grass
Viola hederacea	Native Violet