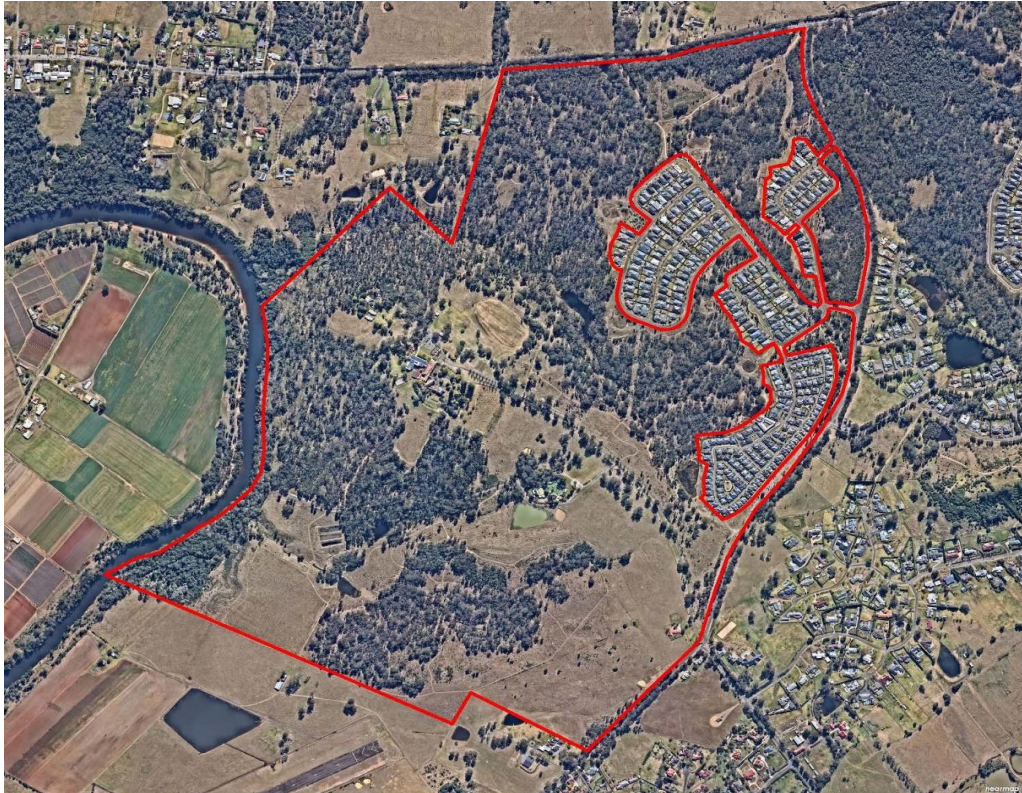


PLANNING PROPOSAL REQUEST

No. 229 Macquarie Grove Road, Cobbitty

(Camden Council)



Prepared For:
Trustees of the Sisters
Of the Good Samaritan
Prepared By:



Volume 2
Annexure "D"
Appendix 5
Biodiversity Overview and Management Principles
(Travers Ecological)

October 2021

Appendix 5. Guide to Managing the Mater Dei Biobank Site, Cobbitty (Part 1)

Guide to managing the
MATER DEI BIOBANK SITE, COBBITTY



Part 1: Site Description and Management Actions

July 2012

**Prepared for the Trustees of the Sisters of the Good Samaritan
by the NSW Office of Environment and Heritage**

EXECUTIVE SUMMARY

The Mater Dei biobank site permanently protects 25.7 ha of high conservation value bushland on the banks of the Nepean River, Cobbitty. The site contains 20 hectares of critically endangered Cumberland Plain Woodland and 6 ha of endangered River Flat Eucalypt Forest. It is home to a variety of threatened fauna species, including the Powerful Owl, Speckled Warbler and the Cumberland Land Snail.

Much of the bushland within the biobank site is currently in poor health and infested with the invasive woody weed, African Olive. Without active management, the bushland will continue to degrade and eventually its conservation values will be lost.

Under a Biobanking agreement established on 9 May 2012 between the landowner (the Trustees of the Sisters of the Good Samaritan) and the NSW Government, the landowner is responsible for implementing a suite of management actions that will restore and maintain the health of this bushland in-perpetuity. Annual payments will be made to the landowner to fund the management of the site, and to monitor and report on the outcomes.

This guide has been prepared to assist the landowner to manage the biobank site in an effective and efficient manner. The guide comprises of two parts:

- Part 1 – Site description and management actions
- Part 2 – Timetable and costs of management (July 2012 – June 2017).

This document forms Part 1 of the implementation guide. It provides an overview of the biodiversity values that are present, the management actions that are required to maintain and improve these values, and the monitoring and reporting activities associated with the agreement.

Part 2 of the guide covers the first five year period of the agreement only. It contains a timetable for implementing the actions and activities that are required by the agreement during this period, and describes the estimated cost of these. It is envisaged that Part 2 of the guide will be updated after five years.

Please note that this document is intended to be a guide only. It does not over-ride or replace the Biobanking agreement for the site, which contains the legal obligations of the landowner. It remains the responsibility of the landowner to ensure that all of its obligations under the Biobanking agreement are satisfied.

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1. Introduction

This document is the first part of a two part guide that has been prepared to assist the landowner in managing the Mater Dei biobank site in accordance with the Biobanking agreement ('the agreement'). It provides an overview of the biodiversity values of the site, the management actions that are required to maintain and improve these values, and the monitoring and reporting requirements of the agreement.

2 Site Description

2.1 LOCATION AND REGIONAL CONTEXT

The Mater Dei property is located on Macquarie Grove Road, Cobbitty, in the local government area of Camden (Map 1). The 280 ha property is owned by the Trustees of the Sisters of the Good Samaritan and contains the Mater Dei Special School and Wivenhoe Historic House. The property borders the Nepean River and has extensive areas of bushland and pasture.

The 25.7 ha biobank site is located in the western section of the property. It directly adjoins the Nepean River, as well as a conservation area that is being established as part of the Wivenhoe Residential Development Project (Map 2).

The biobank site is located within the priority conservation lands of western Sydney. The priority conservation lands are identified in the Cumberland Plain Recovery Plan as being regional priorities for the implementation of actions to recover threatened species, populations and ecological communities (DECCW 2011).

2.2 NATIVE VEGETATION

2.2.1 Vegetation types

The following vegetation types described in Tozer et al (2010) are present on the biobank site:

- Cumberland Shale Hills Woodland, and
- Cumberland River Flat Forest.

The distribution of vegetation types on the site was determined in the field and mapped as part of the Biobanking assessment (Map 3; Table 1).

A list of species recorded from each vegetation type is provided in Appendix A.

Cumberland Shale Hills Woodland (20.1 ha)

This vegetation type is present in parts of the site that are upslope and away from the river. The canopy is dominated by Forest Red Gum (*Eucalyptus tereticornis*) and Grey Box (*Eucalyptus moluccana*).

The mid-storey of much of this vegetation type contains very high densities of the woody weed African Olive. This includes:

- 2.73 ha with 40-80% foliage cover of African Olive, and
- 3.97 ha with >80% foliage cover of African Olive.

Table 1: Vegetation types

Map Unit in Tozer et al (2010)	Equivalent biometric vegetation type referred to in the Biobanking agreement	Equivalent community under State legislation ¹	Equivalent community under Commonwealth legislation ²	Area (ha) mapped during the Biobanking assessment ³
Cumberland Shale Hills Woodland	HN529: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin	Cumberland Plain Woodland in the Sydney Basin Bioregion - critically endangered	Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest - critically endangered ⁴	20.1
Cumberland River Flat Forest	HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	River-Flat Eucalypt Forest on Coastal Floodplains - endangered	N/A	5.6

An open grassy understorey dominated is present where the mid-storey is not dominated by African Olive. *Bursaria spinosa* is the only native shrub species consistently recorded from this vegetation type on the site.

Three areas of native-dominated grassland totalling 1.97 ha occur in the southern section of the site where the native canopy has been removed. In other areas, the native canopy has been much reduced due through dieback. The causes of this are not known.

Cumberland Shale Hills Woodland forms part of the critically endangered Cumberland Plain Woodland ecological community which is protected under State and Commonwealth legislation.

Cumberland River Flat Forest (5.6 ha)

This vegetation type occurs in close proximity to the Nepean River. Canopy species present include Forest Red Gum, Cabbage Gum (*E. amplifolia*), Blue Box (*E. baueriana*), Rough-barked Apple (*Angophora floribunda*), and Broad-leaved Apple (*Angophora subvelutina*). River Peppermint (*E. elata*) is also present in areas immediately adjacent to the river.

The mid-storey of most of this vegetation type (3.85 ha or 69%) contains >80% foliage cover of African Olive. Where present, the native understorey is dominated by grasses and herbs in areas away from the river, and becomes increasingly shrub dominated closer to the river.

The canopy in much of this vegetation type has also been much reduced through dieback. The causes of this are not known

Cumberland River Flat Forest forms part of the endangered River Flat Eucalypt Forest on Coastal Floodplains ecological community which is protected under State legislation.

¹ Threatened Species Conservation Act 1995

² Environment Protection and Biodiversity Conservation Act 1999

³ Includes 0.5 ha of Cumberland Shale Hills Woodland that was assessed as being in low condition using the biobanking methodology

⁴ 14.5 ha of this vegetation type meets the condition thresholds specified in the Commonwealth listing

2.3 THREATENED FLORA AND FAUNA

2.3.1 Threatened flora

There are no records of threatened flora species on the site, although targeted threatened flora surveys have not been undertaken. The site contains potential habitat for the following threatened flora species that have been recorded from nearby properties:

- Brown Pomaderris (*Pomaderris brunnea*) – vulnerable species,
- Camden White Gum (*Eucalyptus benthamii*) – vulnerable species,
- *Marsdenia viridiflora* subsp. *viridiflora* - endangered population,
- Spiked Rice-flower (*Pimelea spicata*) – endangered species, and
- White-flowered Wax Plant (*Cynanchum elegans*) – endangered species.

2.3.2 Threatened fauna

OEH undertook a rapid fauna assessment of the property in 2006 as part of the preparation of the Cumberland Plain Recovery Plan. Three threatened fauna species were recorded from the property during the study:

- Cumberland Land Snail (endangered species) - recorded at a number of localities and is likely to be scattered throughout the property.
- Speckled Warbler (vulnerable species) - groups of two and three individuals were observed in late June 2006 around bulldozed piles of dead African Olive in patchy Grey Box woodland in the northern section of the property. A pair was observed adjacent to the creek line north of the Mater Dei private road in February 2006. It is likely that this species is scattered in suitable habitat throughout the property.
- Powerful Owl (vulnerable species) - a male was heard calling prior to darkness and later in the night a pair was spotlighted almost a kilometre to the north east. It is possible that the two records involved the same individuals.

The following threatened species were not recorded during the 2006 study but had previously been recorded from the property. They were described as follows in the 2006 study:

- Hooded Robin (*Melanodryas cucullata cucullata*) - vulnerable species. This species has been recorded within the Mater Dei/Cobbitty area in the last 10 years and may still occur (D. Hobcroft records).
- Diamond Firetail (*Stagonopleura guttata*) – vulnerable species. There have been sightings of this species within the Mater Dei/Cobbitty area in the last 10 years and it may still occur or visit the area (D. Hobcroft records).
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – vulnerable species. It is likely that this species is widespread throughout the area when dominant eucalypt species are in flower and the African Olive is fruiting.

The following threatened species were not recorded but were considered in the 2006 study to potentially be present:

- Blue-billed Duck (*Oxyura australis*) – vulnerable species. It is likely that this species is an occasional visitor to larger dams within the area.
- Large-footed Myotis (*Myotis macropus*). One Atlas record from south of the property adjacent to the Nepean River. It is likely that this species occurs along the Nepean River on the western boundary of the property.
- Threatened woodland nectarivores including the Black-chinned Honeyeater (*Melithreptus gularis* – vulnerable species) and Swift Parrot (*Lathamus discolor* –

endangered species) particularly when the Ironbarks and Grey Box are in flower, and

- Threatened bat species such as the Greater Broad-nosed Bat and Eastern Freetail-bat are likely to have been overlooked as no bat survey work was conducted in the area.

2.4 WEED AND MANAGEMENT ZONES

The biobank site has been stratified into five weed zones based upon the broad condition of the native vegetation, including consideration of factors such as weediness and native canopy cover. A profile of each weed zone is provided at Appendix B.

The weed zones are further divided into 11 management zones based upon vegetation type and broad management objective. For example, Weed Zone 1 contains one vegetation type but was split into two management zones to separate proposed revegetation areas from an area that is to be retained as a road easement.

Management sub-zones are identified for separate areas that are part of the same management zone. There are 20 management subzones on the biobank site.

Table 2 shows the relationship between weed zones, management zones and management sub-zones.

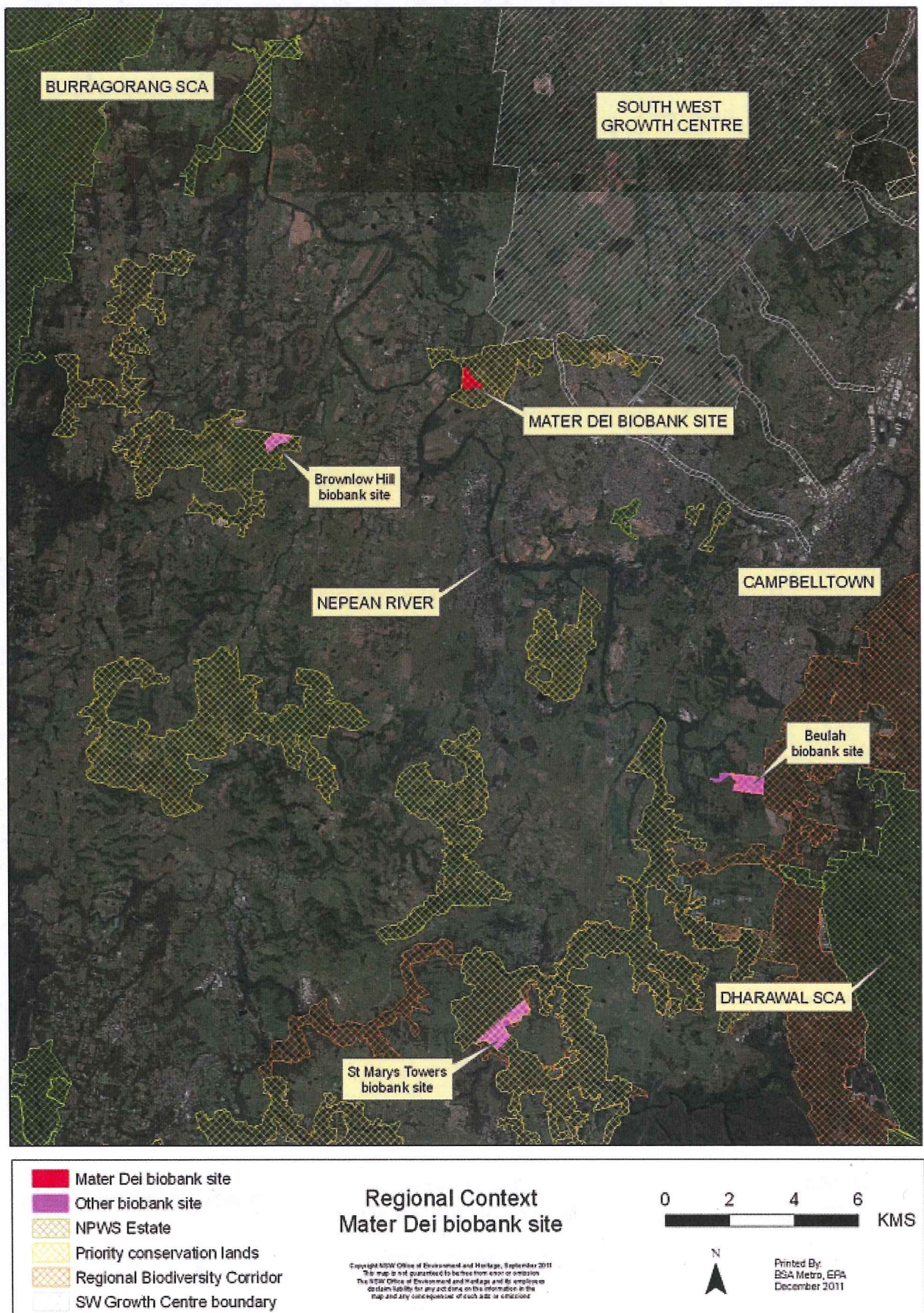
Map 4 shows the locations of the weed and management sub-zones.

Table 2: Weed and Management Zones

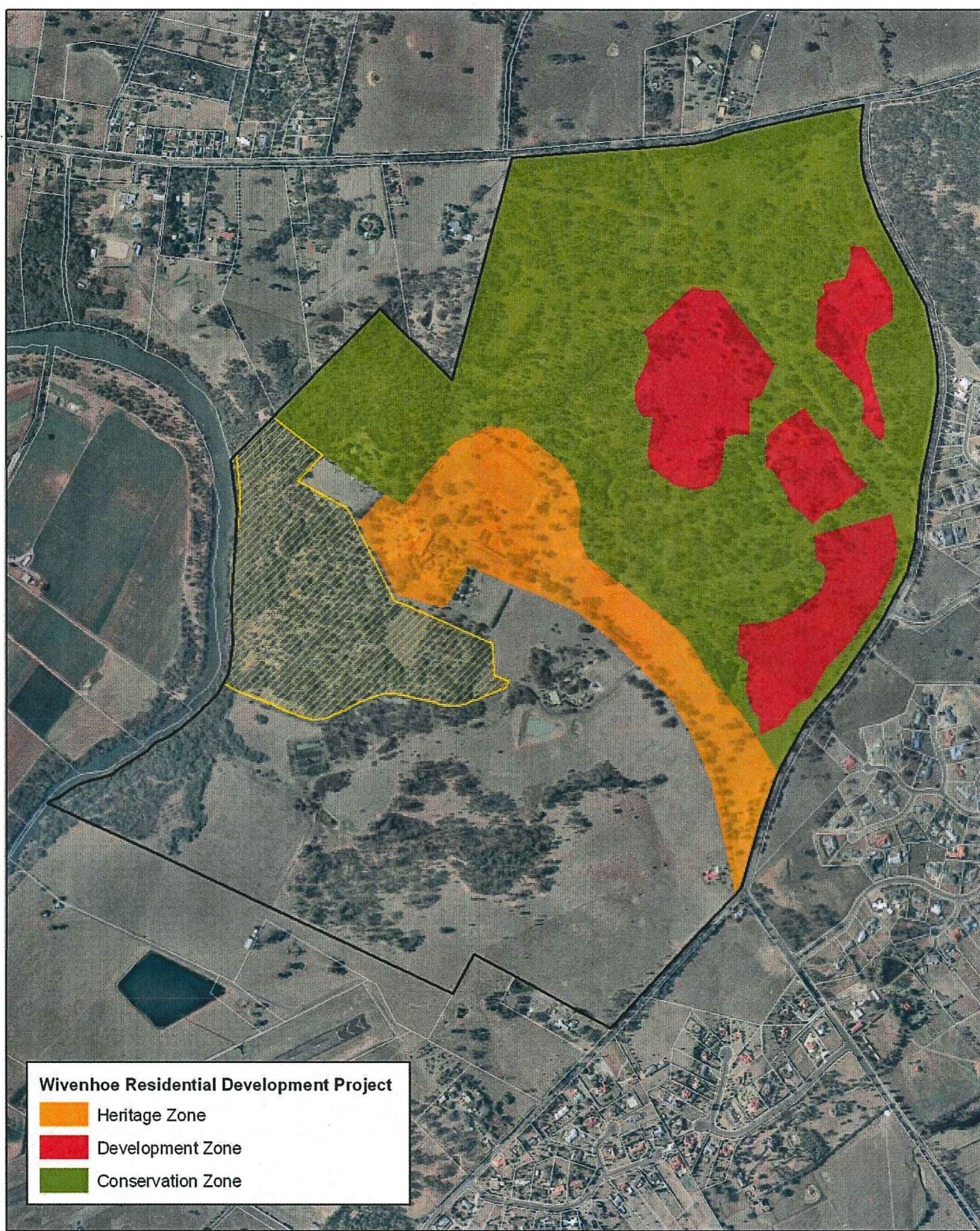
Weed Zone	Management Zone	Management Sub-zone	Area (ha)
WZ1	MZ1_SHW_NO CANOPY_REVEG	MSZ1a	0.37
		MSZ1b	0.96
		MSZ1c	0.35
	MZ9_SHW_EASEMENT	MSZ9a	0.29
WZ2	MZ2_SHW_LOW WEED	MSZ2a	11.43
	MZ7_RFF_LOW WEED	MSZ7a	1.77
WZ3	MZ3_SHW_MODERATE WW	MSZ3a	0.17
		MSZ3b	0.53
		MSZ3c	0.24
		MSZ3d	0.71
		MSZ3e	0.65
		MSZ3f	0.42
WZ4	MZ5_SHW_DENSE WW	MSZ5a	0.22
	MZ5_SHW_DENSE WW	MSZ5b	0.60
	MZ5_SHW_DENSE WW	MSZ5c	0.51
	MZ6_SHW_LOW CONDITION_REVEG	MSZ6a	0.51
	MZ8_RFF_DENSE WW	MSZ8a	0.16
	MZ10_SHW_DENSE WW_REVEG	MSZ10a	2.12
WZ4	MZ11_RFF_DENSE WW_REVEG	MSZ11a	3.69
WZ5	MZ4_SHW_DENSE GW	MSZ4a	0.04

Key: SHW = Shale Hills Woodland; RFF = River Flat Forest; WW = woody weed; GW = ground weed; REVEG = supplementary planting proposed; NO CANOPY = native canopy is much reduced; LOW CONDITION = in low condition as per Biobanking methodology

Map 1: Regional Context



Map 2: Site Context



Legend

- Mater Dei property
- Biobank site
- Cadastre

Site Context
Mater Dei biobank site

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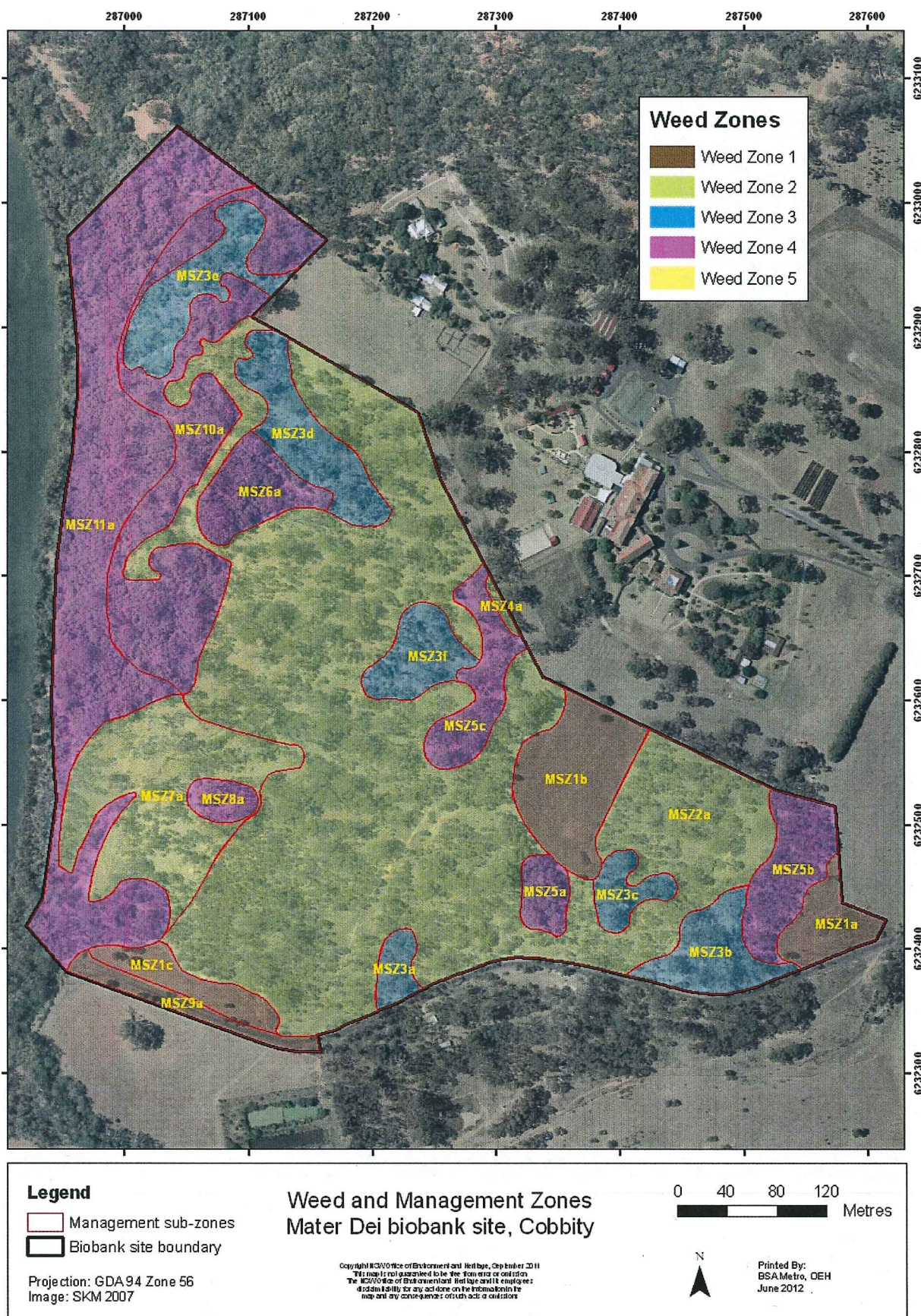


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Map 3: Vegetation Types



Map 4: Weed and Management Zones



3. Management Actions

This section contains an overview of the management actions that are required by the Biobanking agreement to be implemented at the site. These management actions are classified as either passive or active. Passive management actions have little or no cost and include refraining from doing something, such as not removing fallen logs or clearing native vegetation. Active management actions require specific activities to be implemented and have associated costs. Examples of active management actions include weed removal, fencing and erosion control.

Annual payments from the Biobanking Trust Fund will be made to the landowner to fund the implementation of the active management actions, and the monitoring and reporting activities associated with these. The payments include a project management component that can be used to employ a part-time project manager to coordinate the implementation of management actions by contractors.

Part 2 of the guide contains a timetable for implementing the management actions during the first five years of the agreement, and describes the estimated cost of these. It is envisaged that Part 2 of the guide will be updated after five years.

3.1 MANAGEMENT OF GRAZING FOR CONSERVATION

3.1.1 Exclusion of livestock

Grazing by livestock has the potential to damage existing native vegetation and suppress natural regeneration through physical damage, soil compaction and erosion. For these reasons, Item 1.1 (page 32) of the agreement states that stock must not be permitted to graze in any area of the biobank site.

Item 1.4 of the agreement states that, if at any time, the landowner observes stock in any area of the biobank site, the landowner must take necessary measures to remove the stock from the area immediately. It is recommended that the contractors working on the site be asked to notify the landowner if stock are observed within the biobank site.

3.1.2 Requirements relating to fencing and gates

Item 1.1 also requires that stock proof fences and farm gates be installed and maintained around the perimeter of the site to exclude livestock, and that internal fencing and gates be removed. The locations of the fences and gates that must be installed, and the redundant fences and gates that must be removed, are shown in Map 5 (Property Management Actions) of this guide.

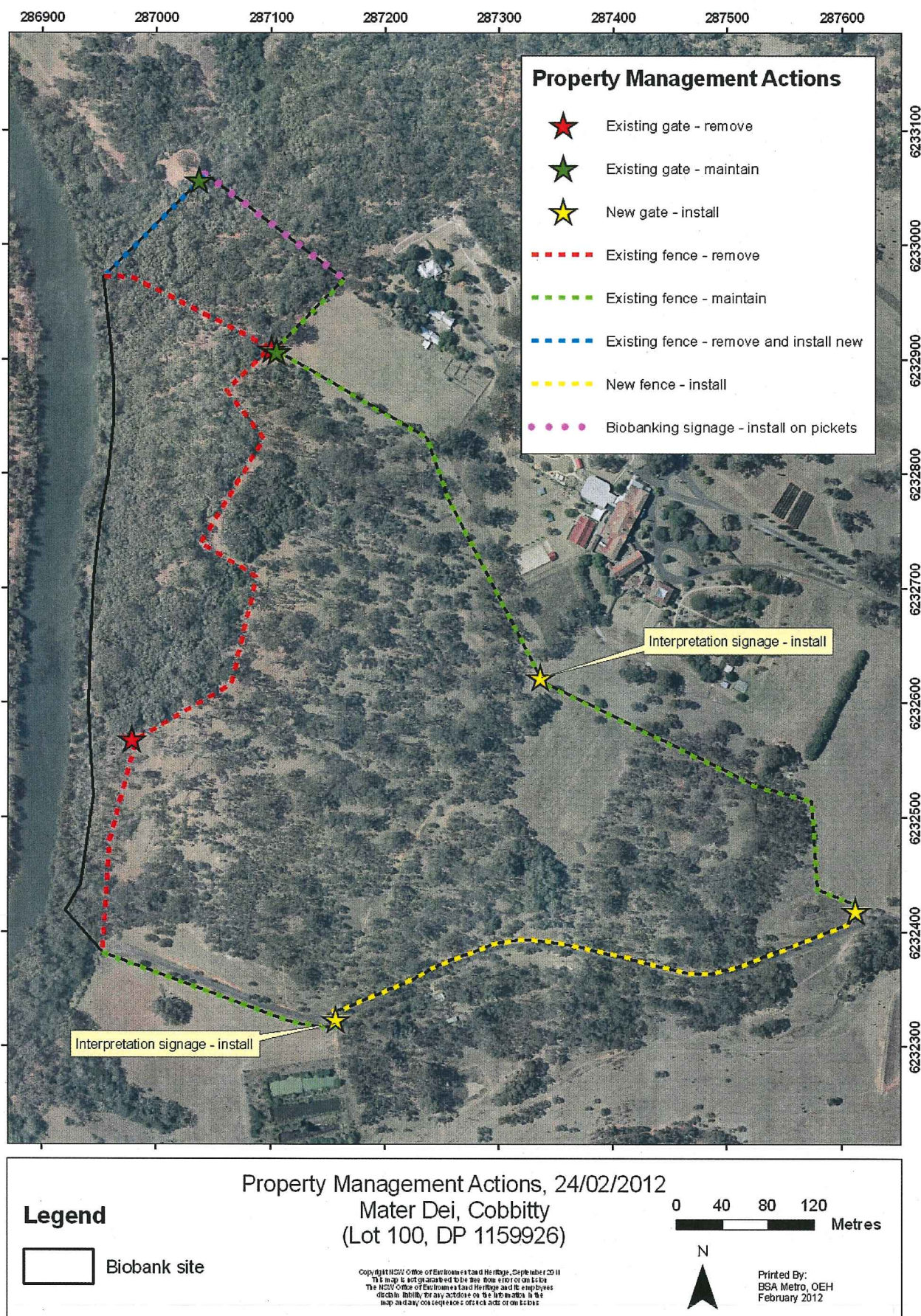
The fencing installed around the perimeter of the site must be stock-proof. It is recommended that, at a minimum, the fences consist of 5 strands of barbed wire with wooden posts every 9 metres and 2 galvanised star pickets in between. Fence removal will involve the removal of wire only with the posts remaining in the ground. The wire should be disposed of at an appropriate recycling facility. The standard of the farm gates to be installed should be, as a minimum, a 3 m wide galvanised gate.

3.1.3 Funding for fences and gates

Funding

Funds for the installation of the new gates and fences will be provided in Year 1 of the agreement. An on-going annual payment of 1/20th of the replacement cost of all the fencing and gates will be provided to cover maintenance costs (i.e. sufficient funds for all fences and gates to be replaced every 20 years). Where this maintenance funding remains unspent in a year, it should be retained for future years when fence and/or gate maintenance will be required.

Map 5: Property Management Actions



3.2 WEED CONTROL

The establishment and spread of environmental weeds can diminish biodiversity values in a number of ways. Environmental weeds can smother established native plants and suppress native seedlings. They compete with native vegetation for resources such as light and water, and alter ecological processes in bushland. They can also displace native fauna by reducing the amount of suitable habitat. The regular and ongoing effective control of environmental weeds on the site is required to ensure that biodiversity values are restored and maintained in the long term.

The weed management plan contained in the agreement (page 50) describes the weed management actions that must be undertaken on the site. This section of the guide provides context and justification for those actions, and guidance on how to effectively implement them. Further information on the appropriate techniques for controlling weeds in bushland is available in 'Recovering bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland' (DEC 2005).

3.2.1 Weed cover

The density of woody weeds and exotic vines at the site is provided in Map 6. The most significant woody weed on the site is African Olive, although significant localised infestations of Small and Large Leaved Privet are also present. Exotic vines such as Moth Vine and Bridal Creeper are scattered throughout the site. One large infestation of Madeira Vine occurs in the near the northern boundary of Management Subzone 3e.

The density of exotic groundcovers at the site is provided in Map 7. The density of ground weeds over much of the site is low (i.e. <10% foliage cover). Moderate to high densities of ground weeds are present in areas where the native canopy is absent or much reduced. One small area on the eastern boundary of the site (Management Subzone 4a) contains very high densities of ground weeds (i.e. >80% foliage cover).

Appendix C describes the distribution of the weeds that have been recorded from the site.

3.2.2 Approach to weed management

Supervision of weed control works

Much of the native vegetation on the site is currently in a moderate to highly degraded state. Professionally planned and implemented weed control is needed to restore the health of the native vegetation, while avoiding the problems that are associated with the over-clearing of weeds (e.g. erosion, loss of native habitat, and the reinvasion of weeds). For these reasons, the methods of weed control section of the agreement (page 53) requires that all weed control activities be undertaken by, or under the direct supervision of, an appropriately qualified bush regenerator.

Level of effort

As described previously (Section 2.4), the site has been divided into 5 weed zones based upon the broad condition of the native vegetation. Profiles for these weed zones are included at Appendix B of this guide. The methods of weed control section of the agreement (page 53) specifies the level of effort (i.e. number of hours) and the broad weed control techniques that must be applied annually in each weed zone.

Work programs

The general approach to weed control at the site is to eliminate mature woody weeds and exotic vines, and reduce the density of groundcover weeds. However, a specific work program has been developed for each weed zone following consideration of factors including:

- the type and extent of weeds that are present,
- the resilience (recovery capacity) of the native vegetation, and
- the risk of erosion.

For example, the primary removal of heavy infestations of African Olive in Weed Zone 4 will be staged over a 10 year period to avoid problems associated with over-clearing. In areas with less dense infestations of woody weeds, primary weed control will either be completed in the first year (Weed Zones 1 and 5) or staged over two years (Weed Zones 2 and 3).

Mechanical weed removal

The agreement (page 55) allows primary woody weed control to be undertaken mechanically using a barrel mulcher within the largest stands of dense African Olive in Weed Zone 4 (i.e. Management Zones 6, 10 and 11). This technique is more cost-effective for dealing with heavy woody weed infestations than non-mechanical techniques. However, mechanical weed control is only permitted in accessible and less sensitive parts of Management Zones 6, 10 and 11 (i.e. low gradient slopes, > 2m from remnant trees, and >25 m from the river bank). In other parts of these management zones, and in all other parts of the site, manual bush regeneration techniques will be applied to control weeds.

Integration with fire management

Primary woody weed treatment should focus on the three proposed fire compartments identified in Map 9 as a priority (see Section 3.3.6) for the following reasons:

- to increase the fuel levels in burn compartments 1 and 2 prior to the planned burns in Years 2 and 6 respectively, and
- to allow regenerating vegetation in burn compartment 3 to be sufficiently established to enable a fire to occur in Year 10.

Performance measures

The weed management plan in the agreement also specifies performance measures for the weed control work in each weed zone after 5 and 10 years. These performance measures are included in Table 3.

3.2.3 Weed control monitoring

The weed control monitoring requirements of the agreement are described on page 56 of the weed management plan and explained below. An 'Annual Monitoring Proforma for Management Zones' (Appendix D) has been prepared to record the outcomes of this monitoring.

Qualifications

Monitoring of the results of the weed control activities must be undertaken by an appropriately qualified bush regenerator every 12 months. This will involve the formal monitoring of ground cover weeds in each management zone, as well as a field inspection to record the condition of each management subzone.

Formal monitoring and reporting of groundcover weed density

At the completion of each 12 month period, the percentage foliage cover of groundcover weeds in each management zone will be measured. The purpose of this monitoring is to measure progress against the performance measures that have been identified for each weed zone.

Table 3: Performance measures for weed control

Weed zone	5 year performance measures	10 year performance measures
Weed Zone 1	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Density of other weeds reduced to <30% foliage cover 	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Density of other weeds reduced to <10% foliage cover
Weed Zone 2	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Density of other weeds maintained at <10% foliage cover 	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Density of other weeds maintained at <10% foliage cover
Weed Zone 3	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Density of other weeds maintained at <10% foliage cover 	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Density of other weeds maintained at <10% foliage cover
Weed Zone 4	<ul style="list-style-type: none"> No mature exotic vines or succulents present Primary treatment of woody weeds completed in 40% of the combined area of the zone No mature woody weeds present in areas where primary treatment has occurred Weed density maintained at <10% foliage cover in areas where primary treatment has occurred 	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Weed density maintained at <10% foliage cover
Weed Zone 5	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Density of other weeds reduced to <30% foliage cover 	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Density of other weeds reduced to <20% foliage cover

The percentage foliage cover of groundcover weeds will be assessed as follows:

- establish a 50 m transect through the most weed affected part of the management zone where weed control work has occurred.
- at 50 cm intervals along the transect (100 points in total) place a 1m high thin stick on the ground (upright) and record whether weed species or native species (or both) are in contact with the stick.
- at each point, score 1 if weed species only are in contact with the stick, score 0.5 if both native and weed species are in contact with the stick, or score 0 if there are no weed species in contact with the stick.
- record the percentage foliage cover as the sum of these values divided by 100.

For the purposes of this monitoring, all non-native species and native species that are outside of their natural range are counted as groundcover weeds if they are less than 1 m in height.

The results of this formal monitoring should be recorded on the 'Annual Monitoring Proforma for Management Zones' (Appendix D).

Visual inspections and reporting of completed works

A visual inspection of all management zones should be undertaken after each 12 month period, with the following information recorded:

- A summary of weed control activities works undertaken for the previous 12 months in the zone and a review of the success of these.
- A description of the current condition of the zone, including reference to the presence/absence of canopy, shrub and/or ground-layer regeneration and any

evidence of dieback, erosion etc. The presence of any threatened flora populations will also be noted.

- Before and after photographs of areas where substantial weed control works have been undertaken (e.g. the primary removal of woody weeds) until end of Year 10. This could include photos taken from permanent photo points (see Section 5.1)
- Descriptions of the type and locations of any significant new or remaining weed infestations. If no weed infestations are present in a zone, this should also be documented.
- Recommendations, if warranted, of any adaptations to the weed control techniques previously applied.

The results of this formal monitoring should be recorded on the 'Annual Monitoring Proforma for Management Zones' (Appendix D).

3.2.4 Review of the weed management plan

Timing and matters for consideration

The weed management plan in the agreement is required to be reviewed by the landowner every four to six years, commencing from July 2012. Item 2.2 (page 33) of the agreement specifies the timing and matters for consideration in the review of the plan. If OEH determines from this review that an update of the plan is required, the landowner must update the plan within three months.

Independent peer review

The review of the plan must be undertaken by an appropriately qualified person that is independent of the project manager and bush regenerator working on the site. None the less, the review needs to be undertaken in consultation with the bush regenerator and project manager to ensure that the professionals working on the site have an opportunity to have their knowledge and ideas appropriately considered. This independent peer review is intended to ensure that the site obtains the best possible management outcomes.

3.2.5 Funding for weed control activities

The payments to the landowner from the Biobanking Trust Fund will include:

- annual funding for weed control,
- annual funding for weed control monitoring (included in the project management budget), and
- funding to update the weed management plan every five years.

3.3 MANAGEMENT OF FIRE FOR CONSERVATION

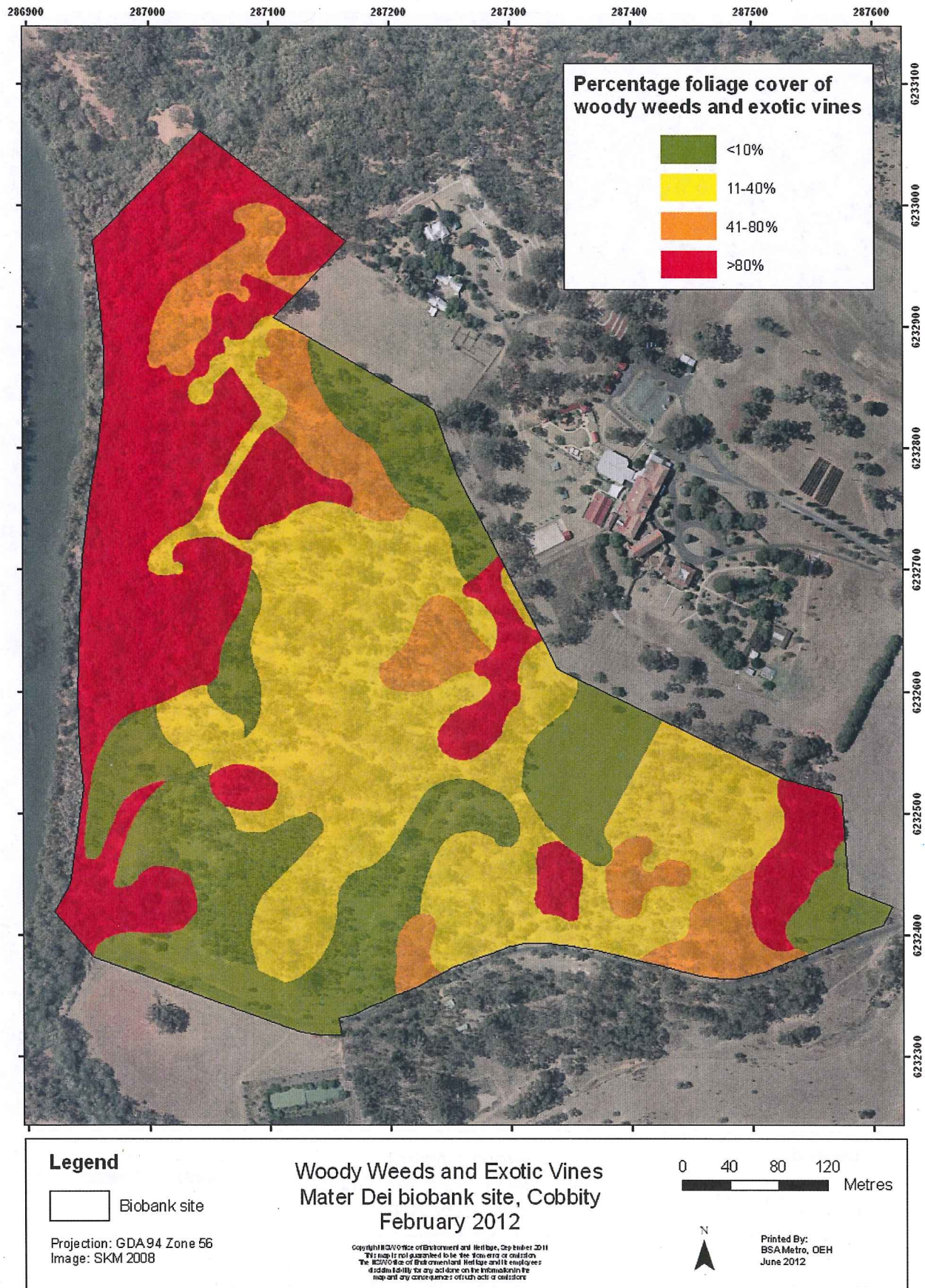
The fire management plan in the agreement (page 59) describes the ecological burn actions that must be undertaken on the site. This section of the guide provides context and justification for those actions, and guidance on how to effectively implement them.

3.3.1 Background

Fire regimes for vegetation types

Different vegetation types are adapted to specific fire regimes i.e. the frequency, intensity and season of fire. Changing a fire regime can alter the structure of bushland and its component species. The Biobanking agreement (pg 59, fire requirements for vegetation types and threatened species) describes the appropriate fire regimes for the two vegetation types that are present on the site. These requirements are included in Table 4 of this guide.

Map 6: Density of woody weeds and exotic vines



Map 7: Density of exotic forbs, grasses and climbers



Table 4: Fire regimes for vegetation types and threatened plants

Vegetation type	Minimum fire interval (years)	Maximum fire interval (years)	Time of year for burning	Fire intensity required	Adjustment required due to wildfires
Cumberland Shale Hills Woodland	5	12	Preferably August to January	Variable	Adjust frequency to ensure minimal interval is maintained if a wildfire or hazard reduction burn occurred.
Cumberland River Flat Forest	7	35	As above	As above	As above
Threatened plants	Minimum fire interval (year)	Maximum fire interval (years)	Time of year for burning	Fire intensity required	Adjustment required due to wildfires
No known threatened plant populations	N/A	N/A	N/A	N/A	N/A

Vegetation fire status

A 2012 vegetation fire status map (Map 8) has been prepared which classifies the vegetation of the site according to the interval since it was last burnt and the optimal fire thresholds for the vegetation type. There have been no known fires on the site in the past 35 years and consequently, all of the vegetation is classified as being underburnt.

3.3.2 Natural assetsThreatened species, populations and ecological communities

Table 6 describes the conditions relating the use of fire and/or mechanical forms of hazard reduction that apply to the threatened species, population and/or ecological communities that may occur on the site (as described in Sections 2.2 and 2.3). These conditions may apply if a Bush Fire Hazard Reduction Certificate is issued to the landowner by the Rural Fire Service to prepare fire control lines and undertake a prescribed burn (see Section 3.3.7 below).

Other values

The biobank site contains steep and erodible slopes. Fire on these slopes need to be managed to minimise erosion.

3.3.3 Cultural heritage assetsAboriginal heritage

A search of the Aboriginal Heritage Information Management System was made on 4 June 2012. No items of Aboriginal cultural heritage significance were recorded on the biobank site.

Non-indigenous heritage

There are no items of non-indigenous heritage known to occur on the biobank site.

3.3.4 Built assets

An old ropes course is located in the southern section of Management Zone 2 within the proposed fire compartment 2 (Map 9). The ropes course (covering approximately 0.5 ha) would need to be protected from the proposed burn if the landowner wanted to retain it. Fencing is the only other built asset within the biobank site.

Table 5: Hazard reduction conditions for threatened species, populations and ecological communities

Scientific name	Common Name	TSC Act	EPBC Act	Presence on site	Species specific conditions relating to the use of Fire	Conditions relating to mechanical forms of hazard reduction
Threatened ecological communities						
N/A	Cumberland Plain Woodland	Critically endangered	Critically endangered	Confirmed (2012) – 20.1 ha of Cumberland Shale Hills Woodland (Map 3)	No fire more than once every 7 years	No slashing, trittering or tree removal
N/A	Sydney Coastal River Flat Forest (i.e. previous name for River Flat Eucalypt Forest)	Endangered	No	Confirmed (2012) – 5.6 ha mapped as Cumberland River Flat Forest (Map 3)	No fire more than once every 25 years	No slashing, trittering or tree removal
Threatened fauna species						
<i>Meridolum corneovirens</i>	Cumberland Land Snail	Endangered	No	Confirmed (2006)	None	No slashing, trittering or tree removal
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	Vulnerable	No	Confirmed (2006)	None	No slashing, trittering or tree removal
<i>Ninox strenua</i>	Powerful Owl	Vulnerable	No	Confirmed although no nesting sites identified (2006)	No burning around known nesting sites at any time	No slashing, trittering or tree removal of or around known nesting sites
<i>Melanodryas cucullata cucullata</i>	Hooded robin (southern form)	Vulnerable	No	Potential (2006)	Species not listed	Species not listed
<i>Stagonopleura guttata</i>	Diamond Firetail	Vulnerable	No	Potential (2006)	None	No slashing, trittering or tree removal
<i>Pteropus poliocephalus</i>	Grey-headed Flyingfox	Vulnerable	Vulnerable	Confirmed (1996)	Avoid known roost sites	Avoid known roost sites
<i>Oxyura australis</i>	Blue-billed Duck	Vulnerable	No	Potential (2006)	Species not listed	Species not listed
<i>Myotis adversus</i>	Large-footed Myotis	Vulnerable	No	Potential (2006)	No fire around known roost sites	No removal of trees
<i>Lathamus discolor</i>	Swift Parrot	Endangered	Endangered	Potential (2006)	Species not listed	Species not listed
<i>Melithreptus gularis</i>	Black-chinned Honeyeater	Vulnerable	No	Potential (2006)	Species not listed	Species not listed
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Vulnerable	No	Potential (2006)	Species not listed	Species not listed
<i>Mormopterus norfolkensis</i>	Eastern Freetail –bat	Vulnerable	No	Potential (2006)	Species not listed	Species not listed
Threatened flora species						
<i>Cynanchum elegans</i>	White-flowered wax Plant	Endangered	Endangered	Potential (2012)	No fire	No slashing, trittering or tree removal
<i>Eucalyptus benthamii</i>	Camden White Gum	Vulnerable	Vulnerable	Potential (2012)	No fire more than once every 15 years	No slashing, trittering or tree removal
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i>	Native Pear	Endangered population	No	Potential (2012)	Species not listed	Species not listed
<i>Pomaderris brunnea</i>	Brown Pomaderris	Vulnerable	Vulnerable	Potential (2012)	No fire more than once every 10 years	No slashing, trittering or tree removal
<i>Pimelea spicata</i>	Spiked Rice-flower	Endangered	Endangered	Potential (2012)	No fire more than once every 5 years	No slashing, trittering or tree removal

3.3.5 Ecological burn actions

Cumberland Shale Hills Woodland

The ecological burn actions contained in the fire management plan require that for Cumberland Shale Hills Woodland:

- the revegetation areas in Management Zones 1, 6 and 10 be protected from wildfires and planned fires as far as possible until the end of Year 12 (i.e. July 2024) to assist with the establishment of the plantings,
- at least three planned fires be undertaken in Cumberland Shale Hills Woodland by the end of Year 12 (i.e. July 2024),
- no more than 20% of Cumberland Shale Hills Woodland remains unburnt for more than 12 years from the start of Year 13 (i.e. July 2024), and
- any single planned fire is not to burn more than 50% of Shale Hills Woodland

River Flat Eucalypt Forest

The ecological burn actions contained in the fire management plan require that for River Flat Eucalypt Forest:

- at least one planned fire be undertaken by the end of Year 20 (i.e. July 2032),
- no more than 20% of River Flat Eucalypt Forest remains unburnt for more than 35 years from the start of Year 21 (i.e. July 2032), and
- any single planned fire is not to burn more than 50% of River Flat Eucalypt Forest.

3.3.6 Fire management strategy

Proposed burn compartments

As indicated in Map 8, all of the native vegetation on the site is currently underburnt. The strategic goal of the fire management plan is to return the vegetation to within its fire threshold as soon as is practical. The achievement of this objective however is tempered by the presence of dense stands of African Olive on large parts of the site. These areas will not carry a fire in their present state. Once primary weed control is completed, these areas can not be burnt until the regenerating and/or planted vegetation is sufficiently established.

Three proposed burn compartments (Map 9; Table 6) have been identified to enable the ecological burn actions (Section 3.3.5 above) to be effectively implemented for the first 12 years of the agreement.

The proposed burns will bring more than 80% of the Cumberland Shale Hills Woodland on the site to within its fire threshold by the end of Year 12, as required by the agreement. Subsequent prescribed burns every four years will be needed to keep 80% of Cumberland Shale Hills Woodland within threshold from Year 13 onward, and to bring 80% of Cumberland River Flat Forest to within threshold by Year 21.

It should be noted that Compartment 3 contains some areas of Management Zone 10. The fire management plan (page 60) states that Management Zone 10 should be protected from fire until the commencement of Year 13 in order to assist the revegetation. During the planning for the burning of Compartment 3 (proposed for Year 10 i.e. 2021-22), the parts of Management Zone 10 that are within the compartment will need to be assessed to determine whether planting has occurred in these areas and if so, whether the plantings are capable of withstanding a prescribed burn. If plantings are present and vulnerable to fire, these areas should be excluded from the compartment.

Burn season and intensity

The fire management plan (page 60: ecological burn actions) states that planned burns should preferably be undertaken between August and January. This period is the optimal fire season for many of Sydney's vegetation types (DEC 2005).

High intensity burns are preferable for native vegetation on the Cumberland Plain as they provide an opportunity for recruitment of a greater number of native plant species. The intensity of a burn is determined by multiple variables including fuel loads, slope and aspect, air temperature and humidity, wind speed and direction.

Current fuel levels are relatively low on the site even though it has not been burnt for over 30 years. Fuel loads in Cumberland Plain vegetation are markedly lower than those found on the surrounding sandstone areas of Sydney (DEC 2005). Burns may need to be undertaken in late spring or early summer when temperatures are high enough to support a burn.

Table 6: Proposed burns to Year 10

Compartment	Year	Date	Area (ha)	Cumberland Shale Hills Woodland (ha)	Cumberland River Flat Forest (ha)	% of SHW within threshold
1	2	2013-14	6.4	4.9	1.5	24%
2	6	2017-18	5.4	5.4	-	51%
3	10	2021-22	5.8	5.8	-	80%

Variability

The greatest species diversity is likely to be maintained by using fire regimes that encourage variation. This includes variation in the length of inter-fire intervals (within thresholds), variation in the fire intensity and in the season of the burn (between August and January) (DEC 2005). Variability in the length of the inter-fire interval could be incorporated into the fire regime at Mater Dei in the long term by varying the size and shape of the burn compartments that are used.

Integration with weed management

Compartments 1 and 2 contain the better condition areas of Cumberland Shale Hills Woodland on the site i.e. areas with low to moderate infestations of African Olive. The primary removal of woody weeds in these areas should be completed as a priority so that the woody debris can be used as a fuel source.

Compartment 3 contains some larger areas of dense African Olive (MZ10). The parts of Management Zone 10 that occur within Compartment 3 should also be cleared as a priority. This will allow the regenerating vegetation within this area the best chance of becoming established by the time of the proposed burn (Year 10).

Prescribed burns can contribute to weed proliferation as a result of increased light conditions, particularly along the more disturbed edges of the site. The weed management program may need to be adjusted to provide for the adequate control of post-fire weed regrowth.

Integration with pest management

Consideration should also be given to integrating any pest management programs (if required) with the proposed burn program. Rabbit control should be considered prior to burning in areas where rabbit numbers are significant, as the post-fire regeneration will be susceptible to herbivory.

The reduced understorey that will be present after the burn will also enable pests (e.g. fox) to move more easily through the landscape, increasing the risks of predation for native mammals and birds. However, the reduced understorey will also increase visibility if a feral pest shooting program is required.

3.3.7 Burn approvals

Bush Fire Hazard Reduction Certificate

The proposed burns at the site can be undertaken as bush fire hazard reduction burns. To obtain approval for this, the landowner will need to submit an application⁵ for a Bush Fire Hazard Reduction Certificate to the Rural Fire Service (RFS) at least three months prior to each proposed burn. The application form should be sent to:

Community Safety Officer
Macarthur Zone
NSW Rural Fire Service
3-5 Alderney St
MINTO 2566
(02) 9603 7077

Bush Fire Hazard Reduction Certificates are issued under the *Rural Fires Act 1997* and provides an environmental approval for bush fire hazard reduction works. The RFS will assess the application in accordance with the Bush Fire Environmental Assessment Code. A certificate will be issued free of charge and is valid for one year from the date of issue.

Protection of the Environment Operations (Clean Air) Regulation 2010

An approval under the *Protection of the Environment Operations (Clean Air) Regulation 2010* is not required if the landowner has obtained a Bush Fire Hazard Reduction Certificate or if the burn is undertaken for agricultural purposes (refer to Clause 12 and Schedule 8 of the Regulation).

3.3.8 Implementation of planned burns

RFS assistance to undertake burns

Macarthur Zone RFS has indicated that it is available to plan and execute hazard reduction burns to manage fuel levels on the site. Burns proposed on the site will be programmed into the annual works program of the Macarthur Zone RFS and executed when weather and other priorities permit.

Fire containment lines

RFS requests that the landowner constructs fire control lines for the proposed burns so that the burns can be undertaken at short notice. The annual payments to the landowner from the Biobanking Trust Fund will include an allocation for the construction of control lines for each burn (i.e. every four years).

The RFS will determine the type and location of fire control lines that are required for each burn and advise the landowner of this when the Bush Fire Hazard Reduction Certificate is issued. The fire management plan (page 61) requires that the fire control lines be constructed, to the greatest extent possible, without disturbance to the soil surface (i.e. by avoiding scraping to mineral earth).

⁵ Available at http://www.rfs.nsw.gov.au/file_system/attachments/State/Attachment_20060131_0DAD2A76.pdf

Threatened species inspections

The fire management plan (page 62) requires that targeted surveys for threatened flora and the Cumberland Land Snail be conducted across each proposed burn compartment prior to burning. The threatened flora that is likely to occur on the site (see Section 2.3.1) and the Cumberland Land Snail can be detected at any time of the year.

The fire management plan (page 62) also requires that:

- the frequency of burns take into consideration the recommended fire frequencies of any threatened species that are present, and
- areas containing the Cumberland Land Snail be avoided when constructing fire control lines.

The annual payments to the landowner from the Biobanking Trust Fund will include an allocation for threatened species inspections prior to each burn (i.e. every four years).

3.3.9 Monitoring and review of the fire management plan

Review and updating the fire management plan

The fire management plan in the agreement is required to be reviewed by the landowner every four to six years, commencing from July 2012. Item 3.2 (page 35) of the agreement specifies the timing and matters for consideration in the review of the plan. If OEH determines from this review that an update of the plan is required, the landowner must update the plan within three months.

Independent peer review

The review of the plan is to be undertaken by an appropriately qualified person that is independent of the project manager and bush regenerator working on the site. None the less, the review needs to be undertaken in consultation with the bush regenerator and project manager to ensure that the professionals working on the site have an opportunity to have their knowledge and ideas for future actions appropriately considered.

This independent peer review is intended to ensure that the site obtains the best management outcomes that are possible. The review is required to include monitoring of the outcomes of the burns that have occurred previously as described below.

Monitoring the outcomes of ecological burns

The fire management plan (page 61) requires that, at the time the review of the plan, visual monitoring of all management zones be undertaken by a suitably qualified ecologist to determine the condition of the vegetation.

The following information must be recorded:

- a general description of the vegetation structure and species composition within each zone (or group of zones),
- an interpretation of the ecological outcomes of previous fires (either planned or unplanned) within the zone, and
- a recommendation on the timing and location for future planned fires within the zone.

3.3.10 Funding for fire management activities

The payments to the landowner from the Biobanking Trust Fund will include:

- funding⁶ to apply for a Bush Fire Hazard Reduction Certificate every four years commencing in Year 2,
- funding to inspect the proposed fire compartments for threatened species every four years commencing in Year 2,
- funding to establish fire control lines every four years from Year 2, and
- funding to monitor and update the fire management plan every five years.

3.4 MANAGEMENT OF HUMAN DISTURBANCE

Potential sources of human disturbance on the site include four wheel drives, mountain bikes, trail bikes, horse riding and rubbish dumping. These activities can damage or destroy native vegetation, promote weed invasion and displace native fauna. The prevention of these disturbances is required to maintain and improve the biodiversity values of the site.

3.4.1 General human disturbances

Item 4.1 (page 36) of the agreement states that human activities that adversely affect biodiversity values on the biobank site, including repeated disturbance of native animals, must not be carried out, or caused or permitted to be carried out, on the biobank site.

An exception to this is provided in Item 4.2 (page 36) of the agreement for human activities that are listed as permissible activities under clause 3 (page 8) of the agreement. These are reproduced in Table 7 below.

Table 7: Permissible human activities on the biobank site

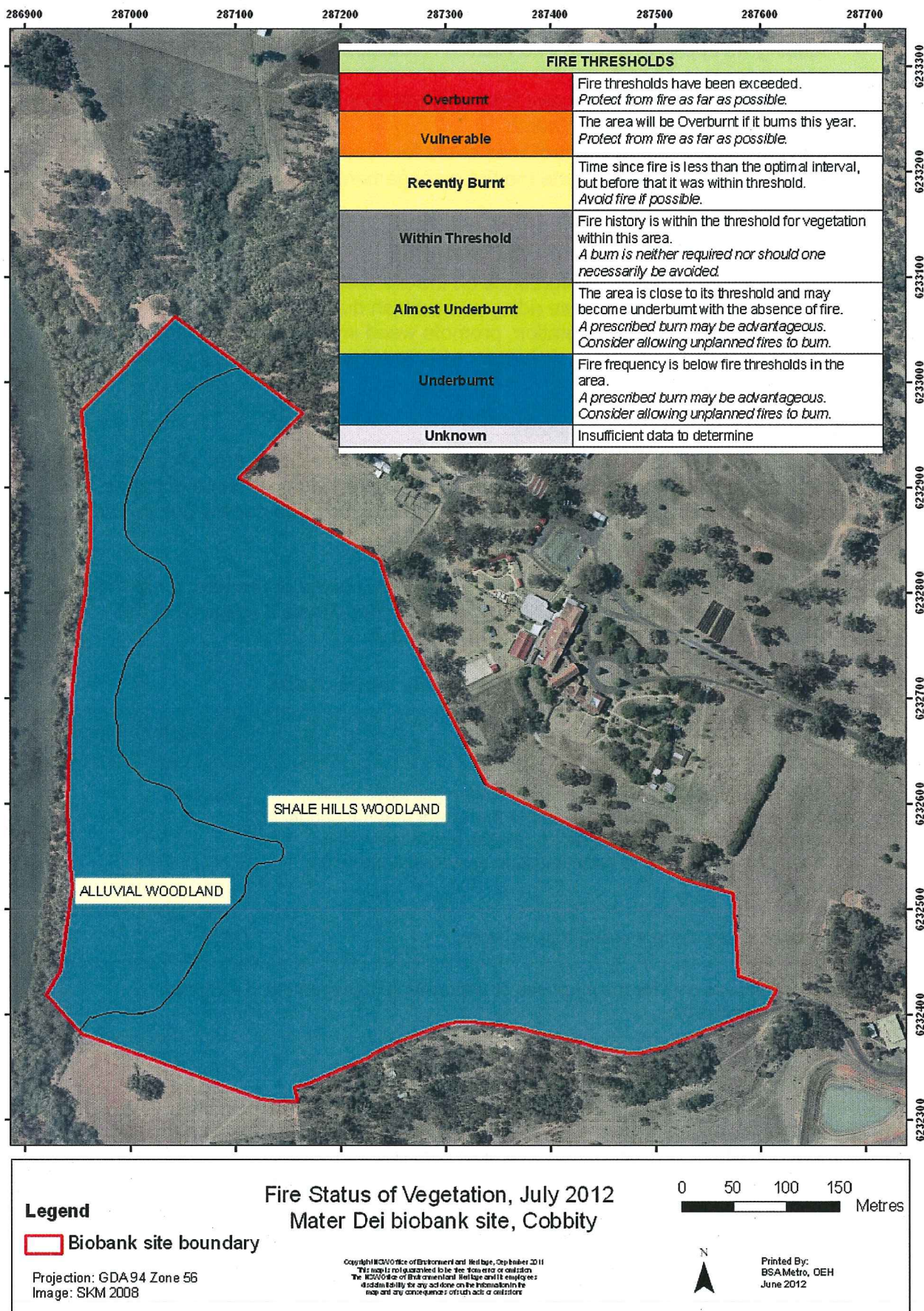
Description of human activities	Management zone/s
Passive recreation, with the exception of overnight stays and/or camp fires, is permissible on the land to the extent that the condition of vegetation on site is not degraded. Passive recreation can include but is not limited to activities such as walking and bird watching.	All zones
Recreational use of the existing ropes course.	MZ2
Vehicular access only for the purposes of undertaking management actions is permissible.	All zones

3.4.2 Waste dumping

Item 4.4 (page 36) of the agreement states that the landowner must not store, dispose of, or cause or permit to be disposed of, any waste on the biobank site. Item 4.5 states that the landowner must take all reasonable steps to remove waste deposited by others on the biobank site, or which is otherwise present on the biobank site. An exception to this is provided for the existing stockpile of gravel in MZ9 which may be retained and used for the purpose of future track maintenance.

⁶ included in project management payment

Map 8: Fire status of vegetation types



Map 9: Proposed burn compartments



3.4.3 Signage

Biobanking signs

Item 4.6 (page 36) of the agreement requires that a total of 20 standard Biobanking signs be installed around the perimeter of the site to deter human disturbance including waste dumping. The Biobanking signs are available from OEH and must be installed by the end of October 2012 (i.e. 4 months from the first payment date) in the following locations:

- on the five gates into the biobank site (see Map 5),
- on six metal star-pickets placed at regular intervals along the line identified in Map 5 as 'Biobanking signage – install on pickets', and
- on the perimeter fence at nine practical interface locations along the lines identified in Map 5 as "Existing fence – maintain" and "New fence – install".

Interpretation signs

Item 4.6 (page 36) of the agreement also requires that two interpretation signs be installed and maintained adjacent to the gates at the locations identified in Map 5 as 'Interpretation signage – install'. The purpose of these signs is to reduce human disturbance to the site by educating users of the site of the values being protected.

The interpretation sign should carry a brief description of the significance of the biobank site in protecting endangered and critically endangered vegetation, and threatened fauna habitat. The interpretation sign must be replaced if the writing or images on the sign are no longer clearly visible or are illegible.

3.4.4 Funding to manage human disturbance

The payments to the landowner from the Biobanking Trust Fund will include:

- funds to purchase and install 20 Biobanking signs and six star-pickets in Year 1,
- funds to purchase and install two interpretation signs in Year 1, and
- funds to replace all signage and star-pickets every 10 years.

3.5 RETENTION OF REGROWTH AND REMNANT VEGETATION

The retention of native vegetation on the biobank site is essential for the flora and fauna habitat values of the site to be maintained and improved over time.

Under Item 5.1 (page 38) of the agreement, native vegetation (whether remnant or regrowth) on the biobank site must not be cut down, felled, thinned, logged, killed, destroyed, poisoned, ringbarked, uprooted, burnt or otherwise removed, except in accordance with Item 5.2 (see below), or if it is required as part of the management actions or it is essential for the carrying out of permissible development under clause 3.5 (page 8) of the agreement.

A note in Item 5.1 states that native vegetation on the site may be managed to improve biodiversity values by thinning to benchmark stem densities no more than 80% of each Management Zone. Such thinning may be necessary in parts of the site that have become overstocked with young Eucalypts. OEH should be contacted prior to undertaking any such thinning to obtain the benchmark stem densities for that vegetation type.

Item 5.2 states that native vegetation on the site must not be burnt except in accordance with the fire management plan.

3.6 REPLANTING OR SUPPLEMENTARY PLANTING

Weed invasion, clearing and grazing has resulted in the native vegetation on much of the site being modified from its natural state. Most of this disturbed native vegetation has moderate or high resilience (recovery capacity) and as such, will improve in condition with sympathetic management (e.g. stock exclusion, weed control, appropriate fire regimes, etc). Some parts of the site however, have been disturbed to such an extent that their recovery capacity has been significantly diminished. Supplementary planting of native species will be undertaken in these areas to assist the recovery of the native vegetation.

3.6.1 Revegetation requirements

A total of 1600 native trees, 2500 native shrubs, and 7560 native groundcovers are required to be planted in the biobank site in the first 10 years of the agreement. Details of the number and species that are to be planted, and the location and timing of the revegetation works, are described in the planting schedule in Item 6.6 (page 40) of the agreement. The planting schedule is reproduced in Table 8 of this guide. The plants are to be supplied in hiko trays i.e. plastic trays of 40 93 ml cells, 100 mm deep.

Modifications to the planting schedule (in terms of numbers, species and areas) can be made if strong natural regeneration is observed within a proposed revegetation area following primary weed removal. The landowner or project manager should discuss any proposed modifications to the planting schedule with OEH prior to implementing them.

Additional requirements for the revegetation works are described in Item 6.1 (page 38) and Item 6.5 (page 40) of the agreement and included below.

Seed collection and propagation

- Seeds and plants used for planting and seeding must be obtained from locally collected provenances, unless there are reasons to do otherwise (e.g. to ensure genetic variability or for adaptation to climate change).
- Any seed collected on site must be used on site or on other adjacent land parcels in landholders' ownership.
- Any seed collected must be collected in accordance with the Florabank Guidelines⁷.
- Seed collection from any species individually listed under the *Threatened Species Conservation Act 1995* must not be undertaken, except any such species specified in Item 6.6.

General requirements for all plantings

- Appropriate site treatment (e.g. weed control) of each area of planting or seeding identified in the planting schedule must be undertaken prior to such planting.
- Planting should be undertaken during the months of March, April and/or May unless there are adverse weather conditions that prevent this. In this case the decision for when it is best to undertake planting will be left to the bush regenerator in consultation with the project manager and landowner.
- Install a soil conditioner (e.g. Terraform or TerraCottem) in planting holes prior to planting.

⁷ Available at http://www.florabank.org.au/default.asp?V_DOC_ID=755

Table 8: Planting schedule

Species' common name	Species' scientific name	Management zone/s of planting	No. of plants per area	Planting method	Timing (months or Year)
Blue Box	<i>Eucalyptus baueriana</i>	MZ1	40	Hiko cell	Within 4 years of commencement
Narrow-leaved Ironbark	<i>Eucalyptus crebra</i>	MZ1	20	As above	As above
Grey Box	<i>Eucalyptus moluccana</i>	MZ1	140	As above	As above
Forest Red Gum	<i>Eucalyptus tereticornis</i>	MZ1	140	As above	As above
Black Wattle	<i>Acacia decurrens</i>	MZ1	50	As above	As above
Acacia falcata	<i>Acacia falcata</i>	MZ1	110	As above	As above
Hickory Wattle	<i>Acacia implexa</i>	MZ1	50	As above	As above
Parramatta Wattle	<i>Acacia parramattensis</i>	MZ1	50	As above	As above
Blackthorn	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	MZ1	50	As above	As above
Wedge-leaf Hop-bush	<i>Dodonaea viscosa</i> subsp. <i>cuneata</i>	MZ1	110	As above	As above
Australian Indigo	<i>Indigofera australis</i>	MZ1	100	As above	As above
Blue Box	<i>Eucalyptus baueriana</i>	MZ6, MZ10	40	As above	Within 24 months of primary weed treatment
Narrow-leaved Ironbark	<i>Eucalyptus crebra</i>	MZ6, MZ10	60	As above	As above
Grey Box	<i>Eucalyptus moluccana</i>	MZ6, MZ10	200	As above	As above
Forest Red Gum	<i>Eucalyptus tereticornis</i>	MZ6, MZ10	200	As above	As above
Black Wattle	<i>Acacia decurrens</i>	MZ6, MZ10	100	As above	As above
-	<i>Acacia falcata</i>	MZ6, MZ10	100	As above	As above
Hickory Wattle	<i>Acacia implexa</i>	MZ6, MZ10	100	As above	As above
Parramatta Wattle	<i>Acacia parramattensis</i>	MZ6, MZ10	100	As above	As above
Blackthorn	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	MZ6, MZ10	90	As above	As above
Wedge-leaf Hop-bush	<i>Dodonaea viscosa</i> subsp. <i>cuneata</i>	MZ6, MZ10	150	As above	As above
Australian Indigo	<i>Indigofera australis</i>	MZ6, MZ10	150	As above	As above
Austral Bugle	<i>Ajuga australis</i>	MZ6, MZ10	20	As above	As above
Purple Wiregrass	<i>Aristida ramosa</i>	MZ6, MZ10	20	As above	As above
Threeawn Speargrass	<i>Aristida vagans</i>	MZ6, MZ10	20	As above	As above
Narrow plantain	<i>Plantago gaudichaudii</i>	MZ6, MZ10	20	As above	As above
-	<i>Plantago varia</i>	MZ6, MZ10	20	As above	As above
Bordered Panic	<i>Entolasia marginata</i>	MZ6, MZ10	80	As above	As above
Wallaby Grass	<i>Austrodanthonia racemosa</i> var. <i>racemosa</i>	MZ6, MZ10	80	As above	As above
Smallflower Wallaby Grass	<i>Austrodanthonia setacea</i>	MZ6, MZ10	80	As above	As above
Red-leg Grass	<i>Bothriochloa decipiens</i> var. <i>decipiens</i>	MZ6, MZ10	80	As above	As above
Tall Sedge	<i>Carex appressa</i>	MZ6, MZ10	80	As above	As above
Tall Chloris	<i>Chloris ventricosa</i>	MZ6, MZ10	80	As above	As above
Barbed Wire Grass	<i>Cymbopogon refractus</i>	MZ6, MZ10	80	As above	As above

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Blue Flax-Lily	<i>Dianella longifolia</i>	MZ6, MZ10	80	As above	As above
Shorthair Plumegrass	<i>Dichelachne micrantha</i>	MZ6, MZ10	80	As above	As above
Fishweed	<i>Einadia trigonos</i> subsp. <i>trigonos</i>	MZ6, MZ10	80	As above	As above
Common Wheatgrass	<i>Elymus scaber</i> var. <i>scaber</i>	MZ6, MZ10	80	As above	As above
Paddock Lovegrass	<i>Eragrostis leptostachya</i>	MZ6, MZ10	80	As above	As above
Snowgrass	<i>Poa sieberiana</i> var. <i>sieberiana</i>	MZ6, MZ10	80	As above	As above
Slender Rat's Tail Grass	<i>Sporobolus creber</i>	MZ6, MZ10	80	As above	As above
Smooth-flower Wallaby Grass	<i>Austrodanthonia pilosa</i>	MZ6, MZ10	80	As above	As above
Wallaby Grass	<i>Austrodanthonia tenuior</i>	MZ6, MZ10	80	As above	As above
-	<i>Austrostipa rudis</i> subsp. <i>rudis</i>	MZ6, MZ10	80	As above	As above
Red-leg Grass	<i>Bothriochloa macra</i>	MZ6, MZ10	80	As above	As above
Windmill Grass	<i>Chloris truncata</i>	MZ6, MZ10	80	As above	As above
Blue Flax-Lily	<i>Dianella revoluta</i> var. <i>revoluta</i>	MZ6, MZ10	80	As above	As above
Tufted Hedgehog Grass	<i>Echinopogon caespitosus</i> var. <i>caespitosus</i>	MZ6, MZ10	80	As above	As above
Kangaroo Grass	<i>Themeda australis</i>	MZ6, MZ10	130	As above	As above
Tufted Hedgehog Grass	<i>Poa labillardieri</i> var. <i>labillardieri</i>	MZ6, MZ10	130	As above	As above
Weeping Grass	<i>Microlaena stipoides</i> var. <i>stipoides</i>	MZ6, MZ10	380	As above	As above
Berry Saltbush	<i>Einadia hastata</i>	MZ6, MZ10	300	As above	As above
Blady Grass	<i>Imperata cylindrica</i>	MZ6, MZ10	300	As above	As above
Rough-barked Apple	<i>Angophora floribunda</i>	MZ11	110	As above	As above
Broad-leaved Apple	<i>Angophora subvelutina</i>	MZ11	110	As above	As above
Camden White Gum	<i>Eucalyptus benthamii</i>	MZ11	60	As above	As above
Blue Box	<i>Eucalyptus baueriana</i>	MZ11	150	As above	As above
River Peppermint	<i>Eucalyptus elata</i>	MZ11	140	As above	As above
Forest Red Gum	<i>Eucalyptus tereticornis</i>	MZ11	140	As above	As above
-	<i>Melaleuca decora</i>	MZ11	50	As above	As above
Black Wattle	<i>Acacia decurrens</i>	MZ11	120	As above	As above
White Sally Wattle	<i>Acacia floribunda</i>	MZ11	120	As above	As above
Hickory Wattle	<i>Acacia implexa</i>	MZ11	120	As above	As above
Parramatta Wattle	<i>Acacia parramattensis</i>	MZ11	120	As above	As above
Blackthorn	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	MZ11	120	As above	As above
Large-leaf Hop-bush	<i>Dodonaea triquetra</i>	MZ11	250	As above	As above
Tick Bush	<i>Kunzea ambigua</i>	MZ11	200	As above	As above
Tree Violet	<i>Melicytus dentatus</i>	MZ11	140	As above	As above
Purple Wiregrass	<i>Aristida ramosa</i>	MZ11	80	As above	As above
Threeawn Speargrass	<i>Aristida vagans</i>	MZ11	80	As above	As above

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-	<i>Austrodanthonia racemosa</i> var. <i>racemosa</i>	MZ11	140	As above	As above
Tall Chloris	<i>Chloris ventricosa</i>	MZ11	140	As above	As above
Barbed Wire Grass	<i>Cymbopogon refractus</i>	MZ11	140	As above	As above
Shorthair Plumegrass	<i>Dichelachne micrantha</i>	MZ11	140	As above	As above
Forest Hedgehog Grass	<i>Echinopogon ovatus</i>	MZ11	140	As above	As above
Fishweed	<i>Einadia trigonos</i>	MZ11	140	As above	As above
Common Wheatgrass	<i>Elymus scaber</i> var. <i>scaber</i>	MZ11	140	As above	As above
Wiry Panic	<i>Entolasia stricta</i>	MZ11	140	As above	As above
Hairy Panic	<i>Panicum effusum</i>	MZ11	140	As above	As above
Scrubby Spurge	<i>Phyllanthus gunnii</i>	MZ11	140	As above	As above
Blue Flax-lily	<i>Dianella caerulea</i> var. <i>caerulea</i>	MZ11	140	As above	As above
Bordered Panic	<i>Entolasia marginata</i>	MZ11	140	As above	As above
Stout Bamboo Grass	<i>Austrostipa ramosissima</i>	MZ11	300	As above	As above
Berry Saltbush	<i>Einadia hastata</i>	MZ11	300	As above	As above
-	<i>Eragrostis benthamii</i>	MZ11	300	As above	As above
Paddock Lovegrass	<i>Eragrostis leptostachya</i>	MZ11	300	As above	As above
Spiny-headed Mat-rush	<i>Lomandra longifolia</i>	MZ11	300	As above	As above
Weeping Grass	<i>Microlaena stipoides</i> var. <i>stipoides</i>	MZ11	300	As above	As above
Kangaroo Grass	<i>Themeda australis</i>	MZ11	300	As above	As above
-	<i>Juncus usitatus</i>	MZ11	300	As above	As above
-	<i>Poa affinis</i>	MZ11	300	As above	As above

Specific requirements for planting trees and shrubs in MZ1

- Plant in a mosaic pattern to maintain a patchwork of open grassland areas
- Plant in 50% of the total area of the zone only
- Avoid planting within 10 m of existing canopy trees or areas where strong natural regeneration is occurring
- Plant trees at a rate of 400 trees/ha and shrubs at a rate of 625 shrubs/ha.
- Install tree guards around each plant and maintained for 3 years from the planting date.

Specific requirements for planting trees and shrubs in MZ6, MZ10 & MZ11

- Plant in 50% of the total area of the zone only
- Avoid planting within 10 m of existing canopy trees or areas where strong natural regeneration is occurring
- Plant trees at a rate of 400 trees/ha and shrubs at a rate of 625 shrubs/ha
- Undertake planting within 24 months of primary weed treatment in an area.
- Install tree guards around each plant and maintained for 3 years from the planting date.

Specific requirements for planting groundcovers in MZ6, MZ10 & MZ11

- Plant groundcovers in nodes covering one square metre and containing six plants
- Install 200 nodes per hectare targeting areas with the lowest capacity for natural regeneration
- Undertake planting within 24 months of primary weed treatment in an area.

3.6.2 Monitoring survival rates and supplementary planting

Item 6.3 (page 39) of the agreement requires that a survey of each planting area be undertaken 24 months after the completion of planting and then every 12 months thereafter, to determine whether the plants have established and survived. If, after the first survey or subsequent surveys, the establishment and survival rate of plants in an area of planting are below those usual for the species and region (i.e. below 85% establishment rate) then the landowner must supplement the planting in the adversely affected areas within a reasonable timeframe (usually within 12 months).

3.6.3 Funding for revegetation works

The payments to the landowner from the Biobanking Trust Fund will include funds to supply, install and maintain:

- 430 plants each year in Management Zone 1 in Years 2 and 3 (i.e. a total of 860 plants); and
- 1200 plants each year in Management Zones 6, 10 and 11 between Years 2 and 10 (i.e. a total of 10,800 plants).

3.7 DEAD TIMBER

Dead timber refers to standing dead trees and fallen timber on the ground. Dead timber provides essential habitat for many native fauna species and can provide micro-habitats for native flora. Dead trees often contain hollows which are important roosting or breeding sites for fauna, particularly arboreal (tree-dwelling) mammals and birds. Fallen timber provides perching habitat for birds and shelter for ground dwelling mammals and reptiles. Fallen timber also contains insects for fauna to forage on.

Item 7.1 (page 44) of the agreement states that dead timber (whether standing or fallen and including branches and leaf litter) must not be removed from or moved within the biobank site, except for the existing large log piles in Management Zones 2, 3 and 7.

The large log piles in Management Zones 2, 3 and 7 are the result of previous mechanical weed control work on the site where African Olive trees were bulldozed into large piles. These piles are now too large to burn, have weeds growing through them, and are potentially habitat for feral animals.

Item 7.1 requires that large (>30 cm diameter) logs in these piles be redistributed across the site to improve access for weed control and to improve biodiversity values. It also requires that the log piles and their immediate surrounds be inspected for the presence of the Cumberland Land Snail prior to any disturbance. Areas containing the Cumberland Land Snail are to be left undisturbed.

Item 7.2 (page 44) of the agreement permits timber from outside the biobank site to be introduced to and placed on the biobank site to improve biodiversity values if certain record keeping requirements are met.

The payments to the landowner from the Biobanking Trust Fund will include funds to move the large logs from the log piles into nearby areas, and to inspect the log piles for Cumberland Land Snails prior to disturbing them.

3.8 EROSION CONTROL

Soil erosion can occur when native vegetation has been removed exposing bare soils and making them susceptible to dispersal by wind or water. Soil erosion often occurs along creek lines and slopes where water flows are concentrated but can also occur in paddocks where overgrazing or vegetation clearance exposes bare soil. Soil erosion can be difficult to remedy especially along creek lines.

Item 8.1 (page 44) of the agreement states that all reasonable steps must be undertaken to prevent, control and remedy erosion on the biobank site. Soil management for preventing and controlling erosion is to be undertaken using best practice management, such as that developed by the Soil Conservation Service, applied as relevant for the biobank site.

Item 8.1 also requires that the following erosion control measure be implemented during primary weed control work in MZ10 and MZ11:

- African Olive logs and branches will be strategically placed across steep slopes and gullies and fixed in place using wooden stakes.
- African Olive branches to be used are to be generally free from seed propagules.

The payments to the landowner from the Biobanking Trust Fund will include funds to undertake this erosion control work annually until the completion of primary weed control work in Year 10 of the agreement.

3.9 RETENTION OF ROCKS

Rocks are an important habitat feature and serve many purposes in the natural environment. They provide habitat for native flora and fauna species, some of which are threatened. Many animals use rocks and rock environments for shelter and to hide from predators, find food, avoid extreme weather conditions and escape bushfires. Rocks are also known to provide egg-laying sites for reptiles.

Item 9.1 (page 45) of the agreement states that the landowner must not remove, or cause or permit to be removed, rocks from the biobank site or move, or cause or permit to be moved, rocks within the biobank site.

3.10 CONTROL OF FERAL AND OVERABUNDANT NATIVE HERBIVORES

The management plan to control feral and overabundant native herbivores ('feral herbivore management plan') contained in the agreement (page 64) describes the management actions that must be undertaken on the site to control feral herbivores. This section of the guide provides context and justification for these actions, and guidance on how to effectively implement them.

3.10.1 Impact of herbivores

Herbivores have the potential to significantly affect the regeneration of native vegetation on the site. Over-grazing can result in the loss of plant species, erosion and habitat destruction. These species also compete for limited food and shelter with less abundant fauna species.

Four feral herbivore species have been identified as occurring or likely to occur at the site (Table 9). There are no overabundant native herbivores present. The current level of impact on vegetation from herbivores is considered to be negligible. Grazing by rabbits poses the greatest potential threat to regenerating vegetation on the site.

Table 9: Feral herbivores present or likely to be present

Name of feral herbivore	Description of extent	Management zone/s
Rabbits <i>Oryctolagus cuniculus</i>	Present in low numbers	All
Hares <i>Lepus europaeus</i>	Present in low numbers	All
Deer	Observed on adjacent property, may be present occasionally	All
Goats	No sightings, may be present occasionally	All

Efforts to control feral herbivores must be implemented if there is evidence of significant grazing pressure on the site. The control efforts should be prioritised to protect the parts of the site that are more sensitive to grazing pressures, such as revegetation areas or areas that are regenerating after fire.

3.10.2 Suitable control methods

The possible control methods for feral herbivores are described in Table 10 below.

Table 10: Feral herbivore control methods considered

Feral type	Name and description of program or method	Describe suitability
Rabbits/Hares	Pindone baiting	Pindone baiting is an effective means of controlling rabbits but is not appropriate in areas accessed by macropods, stock animals, domestic pets or children. It may however be suitable in future years if used in accordance with regulatory requirements and with appropriate safeguards (e.g. bait stations to exclude macropods).
Rabbits/Hares	Fumigation and destruction of burrows	Fumigation of active burrows with phosphine tablets and then collapsing the burrows is an effective control method as rabbits do not readily dig new burrows. This action could be undertaken in conjunction with the removal of surface shelter (e.g. weed thickets, rubbish) in areas where rabbits are active.
All	Temporary fencing	Temporary fencing (eg. plastic barrier mesh) could be used to protect revegetation areas if the proposed tree guards are determined to not be providing enough protection from herbivores. It may also be used to protect natural regeneration in areas that have been recently burnt.
All	Controlled shooting program	Shooting is suitable for multiple feral species, and may be appropriate if goats or deer are observed regularly on the biobank site. Shooting is species specific and considered humane. All appropriate licences and permits must be obtained by the shooting contractor.

The planning of feral herbivore control activities requires consideration of the specific threat to be managed, as well as the prospect of the management objective being achieved. For example, rabbit culling may potentially be warranted for a defined period of time to enable the re-establishment of native ground cover in actively regenerating areas. However, indiscriminate culling of widespread feral species within the site is only likely to have a short term effect in reducing impacts.

Factors to take into consideration when determining the type, frequency and timing of feral herbivore control activities include the type and abundance of feral pests present, their level of impact on regenerating vegetation in different parts of the site,

and the feral pest control budget. The feral herbivore management plan establishes an annual monitoring and inspections program to assist in making these decisions (see Section 3.10.3 below).

The suitable control methods for feral herbivores (as identified in the feral herbivore management plan) are described in Table 11 below. Decisions regarding the type, frequency and timing of feral herbivore control activities on the site must be made by a suitably qualified bush regenerator or ecologist, in consultation with the project manager or landowner. It is envisaged that the bush regenerator undertaking the weed control works at the site will be the person making these decisions.

Table 11: Required feral herbivore control methods

Management zone/s	Feral type	Method of control	Frequency and timing
All	Rabbits/Hares	<p><u>Temporary fencing of re-vegetation areas</u></p> <p>1.1 Temporary fencing is to be installed around the planted vegetation if there is evidence of significant grazing pressure on the plantings in these zones. It may also be used elsewhere on the site if there is evidence of significant grazing pressure on natural regeneration in areas that have been recently burnt.</p>	To be determined by a suitably qualified bush regenerator or ecologist, in consultation with the project manager or landowner.
All	All	<p><u>Fumigation and destruction of burrows</u></p> <p><u>Note:</u> The 'Monitoring and Inspections' section of the management plan requires that each year the number of active rabbit burrows on the site are to be qualitatively recorded as being either Negligible (N), Minimal (Min), Moderate (Mod) or High (H).</p> <p>2.1 If the annual monitoring identifies that the number of active rabbit burrows on the site is either Moderate or High then the following actions are to be undertaken within 12 months of the next payment date:</p> <p>a. <u>Identification of priority areas for treatment</u></p> <p>A suitably qualified bush regenerator or ecologist is to identify priority areas for the treatment of burrows (that is, the fumigation and destruction of burrows) and/or for a shooting program. The priority areas are to be identified based on a consideration of the information obtained from the annual monitoring.</p> <p>b. <u>Identification of the level of effort required</u></p> <p>A suitably qualified bush regenerator or ecologist is to identify the number of person days to be applied to the treatment of burrows in the priority areas and/or for a shooting program.</p> <p>A 'person day' is equivalent to the effort of one person working for 8 hours.</p> <p>The number of person days applied within the 12 month period is to be adequate to address the threat to native vegetation and equal to or less than the 'surplus</p>	To be determined by a suitably qualified bush regenerator or ecologist, in consultation with the project manager or landowner.

		<p>person days' available.</p> <p>The number of 'surplus person days' available is as identified in the annual monitoring (refer to the Monitoring and Inspections section).</p> <p>c. <u>Treatment of burrows</u></p> <p>Active rabbit burrows, as determined by fresh diggings or scats, are to be fumigated and destroyed within the priority areas identified in subclause a) above.</p> <p>The number of burrows treated is to be the number capable of being treated by the number of person days identified in subclause b) above.</p> <p>The person days of effort applied to the treatment of burrows may also be applied to the removal of surface rubbish that may provide shelter for rabbits within the priority areas identified in subclause a).</p>	
All	All	<p><u>Shooting program</u></p> <p>3.1 A shooting program may be implemented as an alternative to the fumigation and destruction of burrows if:</p> <ul style="list-style-type: none"> d. goats or deer have been observed within the site, or e. a shooting program is demonstrated to be a more effective method of control. <p>3.2 If a shooting program is to replace the fumigation and destruction of burrows in any given year, then the number of person days applied to the treatment of burrows is to be replaced with an equivalent number of person nights of shooting.</p>	To be determined by a suitably qualified bush regenerator or ecologist, in consultation with the project manager or landowner.

3.10.3 Monitoring and inspections

The monitoring and inspection section of the feral herbivore management plan (page 66) establishes an annual program to monitor the impacts of feral herbivores on the site, and the level of effort that has been spent on feral herbivore control. This section of the plan is reproduced in Table 12 below.

It is envisaged that the monitoring will be undertaken by the project manager or the bush regeneration contractor working on the site. Observations of active rabbit burrows and other evidence of feral pests should be recorded on the 'Annual Monitoring Proforma for Management Zones' (Appendix D).

Table 12: Monitoring and inspections of feral herbivores

Management zone/s	Feral type/s	Method of monitoring	Date/s required
All	All	All monitoring is to be undertaken by a suitably qualified bush regenerator or ecologist	Annually, at the completion of each year from the first payment date, or more often as required.
All	All	<p><u>1. Observations of active rabbit burrows</u></p> <p>A record is to be maintained and updated regularly on any active rabbit burrows on the site. An 'active rabbit burrow' is as determined by fresh diggings or scats adjacent to a burrow.</p> <p>The record is to qualitatively identify the number of active rabbit burrows within each management zone as being either Negligible (N), Minimal (Min), Moderate (Mod) or High (H).</p> <p>The monitoring must involve consultation with the bush regeneration team working at the site to document any active rabbit burrows that they may have seen.</p>	As above
All	All	<p><u>2. Observations of feral pests</u></p> <p>A record is to be maintained and updated regularly on any traces or sightings of feral pests on the site. The record is to identify the species observed and a qualitative indication of the number of occurrences of the species as being either Negligible (N), Minimal (Min), Moderate (Mod) or High (H).</p> <p>The monitoring must involve consultation with the bush regeneration team working at the site to document any observations of vertebrate pests that they may have seen.</p>	As above
		<p><u>3. Reporting on no. of active rabbit burrows treated</u></p> <p>Reporting will be provided on the number of active burrows treated since:</p> <p>a) the date of the last reporting, and</p> <p>b) the first payment date as a cumulative total.</p>	As above
		<p><u>4. Reporting on no. of person days applied to the treatment of burrows</u></p> <p>Reporting will be provided on the number of person days applied to the treatment of burrows, and/or the number of person nights applied to shooting programs, since:</p> <p>a) the date of the last reporting, and</p> <p>b) the first payment date as a cumulative total.</p>	As above
		<p><u>5. Reporting on the no. of surplus person days available for future treatment of burrows</u></p> <p>Reporting is required to be provided on the number of surplus person days available for the future treatment of burrows. This number of 'surplus person days' is determined by the following formula:</p> <p>(Number of 'surplus person days') =</p> <p>[(2 person days per year) x (number of payment dates that have occurred)] – [number of person days applied to the treatment of burrows since the first payment date]</p>	As above

Reporting on the feral pest control work that has been undertaken at the site, and the priorities for future control should be recorded on the 'Annual Reporting Proforma for Feral Pests'⁸ (Appendix E).

3.10.4 Review of the feral herbivore management plan

Timing and matters for consideration

The feral herbivore management plan in the agreement is required to be reviewed by the landowner every four to six years, commencing from July 2012. Item 10.2 (page 46) of the agreement specifies the timing and matters for consideration in the review of the plan. If OEH determines from this review that an update of the plan is required, the landowner must update the plan within three months.

Independent peer review

The review of the plan must be undertaken by an appropriately qualified person that is independent of the project manager and bush regenerator working on the site. None the less, the review needs to be undertaken in consultation with the bush regenerator and project manager to ensure that the professionals working on the site have an opportunity to have their knowledge and ideas appropriately considered. This independent peer review is intended to ensure that the site obtains the best possible management outcomes.

3.10.5 Funding for feral herbivore control

The payments to the landowner from the Biobanking Trust Fund will include funds to undertake feral pest control, including both feral herbivore and vertebrate pest control activities. It is envisaged that if this funding is not required in any one year, it will be allowed to accumulate so that sufficient funds will be available if a significant threat from feral pests arises at the site in future years.

3.11 VERTEBRATE PEST MANAGEMENT

The vertebrate pest management plan (page 70) contained in the agreement describes the management actions that must be undertaken on the site to control vertebrate pests. This section of the guide is intended to provide context and justification for these actions, and guidance on how to effectively implement them.

3.11.1 Impact of vertebrate pests

A wide variety of vertebrates have been introduced into Australia since European settlement. Many have become pest species, adapting to the Australian environment and having significant impacts on the unique and fragile native fauna and flora.

Threats caused by vertebrate pests to biodiversity values include predation (e.g. cats and foxes), competition with native species for food and nesting sites (e.g. introduced bird species), and the potential to act as reservoirs for exotic diseases (e.g. pigs and foot-and-mouth disease).

The fox is the only vertebrate pest species that has been identified at the site and which is considered likely to occur persistently (Table 13). Feral cats may also be present infrequently.

⁸ The proforma requires information on the actual funds spent on feral pest control while the Biobanking agreement requires information on the 'no. of person days' spent on feral pest control. Reporting on the actual funds spent is more useful and can easily be converted to 'no. of person days' if required. For the purposes of this reporting, feral herbivore activities and vertebrate pest control activities have been combined as 'feral pest' control activities.

Table 13: Vertebrate pests present or likely to be present

Vertebrate pests		
Name of Pest	Description of extent	Management zone/s
Fox <i>Vulpes vulpes</i>	Likely to be present	All
Cat <i>Felis catus</i>	Possibly present infrequently	All

Foxes are likely to predate on a broad range of fauna species at the site. However, none of the threatened fauna species known to occur on the site (see section 2.3.3) are identified in the NSW Red Fox Threat Abatement Plan (TAP) as a priority threatened species for fox control.

3.11.2 Suitable control methods

The options available for the control of foxes and cats are identified in Table 14. The table also provides comments on the appropriateness of use of the different control methods at the site. Previous expert advice at a site in a similar semi urban setting identified that the most effective method for controlling vertebrate pests is a controlled shooting program.

A decision to undertake a controlled shooting program is to be made if there is evidence of a significant threat to threatened fauna or flora at the biobank site from vertebrate pests. Decisions on the frequency and timing of the shooting program are to be made by the landowner, in consultation with the project manager and feral animal control contractor.

Vertebrate pests are wide ranging and require coordinated management across land tenure. Ideally, any vertebrate pest control program implemented at the site will be part of a coordinated program across neighbouring properties.

3.11.3 Monitoring of vertebrate pests

The monitoring and inspection section of the vertebrate pest management plan (page 71) requires that monitoring of vertebrate pests be undertaken annually as part of the 'Monitoring of feral pests' component of the feral herbivore management plan.

It is envisaged that the monitoring will be undertaken by the project manager or the bush regeneration contractor working on the site. The monitoring will involve walking through the site and recording any evidence of vertebrate pests (sightings or traces) on the 'Annual Monitoring Proforma for Management Zones' (Appendix D).

A summary of vertebrate pest observations on the site must then be recorded on the 'Annual Reporting Proforma for Feral Pests' (Appendix E). The summary should include a description of vertebrate feral pests that have been observed (traces or sightings) on the biobank site during the previous year, and a qualitative indication of the number of occurrences as being either Negligible (N), Minimal (Min), Moderate (Mod) or High (H). The summary should be prepared in consultation with the people that have spent the most time on site during the year.

A summary of the vertebrate pest control work that has been undertaken at the site, and the priorities for future control is also required to be recorded on the 'Annual Reporting Proforma for Feral Pests'

Table 14: Vertebrate pest control methods considered

Feral Type	Method of Control	Suitability of control method
Fox / Cats	1080 Fox Bait	Baiting is not considered to be effective for this site as it needs to be undertaken across properties at the landscape scale to be effective. Baiting also has the potential to impact on non-targeted species such as native carnivores, domestic dogs and cats.
Fox / Cats	Leg Hold Trapping	Leg hold trapping is a suitable method for catching foxes and cats but it is time consuming and therefore costly.
Fox	Den Fumigation	No obvious dens were identified within the biobank site however this method could be undertaken if required.
Fox / Cats	Pest Control by Shooting	Shooting has benefits of being suitable for multiple feral species, is species specific and considered humane. A multi species approach is likely to be the most cost effective means to control feral animals at the site. Indiscriminate culling of widespread feral species within the site is likely to have only a short term effect in reducing impacts. This is particularly the case as these pest species are wide ranging and require coordinated management across land tenure.

3.11.4 Review of the vertebrate pest management plan

Timing and matters for consideration

The vertebrate pest management plan in the agreement is required to be reviewed by the landowner every four to six years, commencing from July 2012. Item 11.2 (page 48) of the agreement specifies the timing and matters for consideration in the review of the plan. If OEH determines from this review that an update of the plan is required, the landowner must update the plan within three months.

Independent peer review

The review of the plan must be undertaken by an appropriately qualified person that is independent of the project manager and bush regenerator working on the site. None the less, the review needs to be undertaken in consultation with the bush regenerator and project manager to ensure that the professionals working on the site have an opportunity to have their knowledge and ideas appropriately considered. This independent peer review is intended to ensure that the site obtains the best possible management outcomes.

3.11.5 Funding for vertebrate pest control

The payments to the landowner from the Biobanking Trust Fund will include funds to undertake feral pest control, including both feral herbivore and vertebrate pest control activities. It is envisaged that if this funding is not required in any one year, it will be allowed to accumulate so that sufficient funds will be available if a significant threat from feral pests arises at the site in future years.

4. Minor Alterations to Management Actions

Item A5 (page 31) of the agreement permits the landowner to make minor alterations to any management actions as part of adaptive management, where the outcomes of monitoring, including documented observations of the landowner or his/her servant, lessee, agent or licensee/s, indicate that the minor alterations to the management actions are required to improve biodiversity values in accordance with the Biobanking agreement.

The landowner must document the minor alterations made to the management actions and the reasons for the alterations, and retain a record of the documentation and include it in the annual report.

5. Monitoring, Reporting and Record Keeping

Annexure D (page 73) of the agreement describes the monitoring, reporting and record keeping requirements of the biobank site. They include the following:

- Annual photographs taken from fixed photo-points,
- 6 and 12 monthly inspections of the site, and
- Preparation of an annual report.

These requirements are described below and are additional to the monitoring and reporting requirements for weed management (Section 3.2.3), fire management (Section 3.3.9), supplementary planting (Section 3.6.2), feral herbivores (Section 3.10.3) and vertebrate pests (Section 3.11.3) described previously in this guide.

The payments to the landowner from the Biobanking Trust Fund will include funds to undertake these monitoring and reporting activities.

5.1 PHOTO-MONITORING

Photographs must be taken from photo-points at each of the locations and in the directions identified in Appendix F of this guide every 12 months. The purpose of the photographs is to show changes over time. It is envisaged that the photographs will be taken during the 12 month inspection of the site (see 5.2 below)

Photographs should be taken at approximately the same direction, location, height and time of day (during daylight hours) each year and retained for the life of the agreement. All photographs must be dated, stating the direction in which they were taken and identified with their locations.

Photographs that were taken at each of the photo-points in March 2011 are included in Appendix G. The locations of the photo-points are marked in the field with a metal star-picket.

5.2 SITE INSPECTIONS

An inspection of the biobank site must be undertaken by, or on behalf of, the landowner for the purposes specified in column A of Table 15 (below) and at the relevant intervals specified in column B. The inspections are to occur at the intervals indicated starting from the commencement date of the agreement (i.e. 9 May 2012).

The results of the inspections should be recorded on the 'Inspection Checklist' provided at Appendix H of this guide. Please note that the 'Inspection Checklist' does not include a column to record native ground cover for the purposes of Item 1.1 (i.e. strategic grazing). No strategic grazing is proposed for the site and consequently, this monitoring is not required.

Table 15: Site inspection and monitoring schedule

Site inspection and monitoring schedule	
A. Purpose	B. Interval
The percentage of ground cover present on the biobank site for the purposes of item 1.1 of Section 1 of Annexure C.	Every 12 months
Number of stock and date/s when stock have entered the management zones on the biobank site.	Every 6 months
Physical condition of fencing and gates to determine whether they are maintained to a standard that can: <ul style="list-style-type: none"> control the movement of stock if required under item 1 in Section 1 of Annexure C control human disturbance if required under item 4 in Section 1 of Annexure C control the movement of feral and overabundant native herbivores if required under item 10 of Section 2 control vertebrate pests if required under item 11 of Section 2 	Every 12 months
Records of any human disturbance on the biobank site. Note: items 4.1 and 4.2 in Section 1 of Annexure C and clause 2 of this agreement place restrictions on human activities on the biobank site.	Every 6 months
Evidence of erosion. Note: item 8 in Section 1 of Annexure C contains requirements for erosion control.	Every 6 months
Evidence of waste. Note: item 4.4 in Section 1 of Annexure C contains requirements for storing and disposing of waste on the biobank site.	Every 6 months

5.3 ANNUAL REPORT

The landowner must submit an annual report using the annual reporting template provided in Appendix I within 30 days of the end of each reporting period for the agreement. The reporting period for the agreement is 12 months after the first payment date (4 July 2012) and every subsequent period of 12 months.

The reporting template at Appendix I has been modified from the template in the Biobanking agreement to remove reference to the following management actions:

- 12. Nutrient control
- 13. Control of exotic fishes, and
- 14. Maintenance or reintroduction of natural flow regimes.

This is because these three management actions do not form part of the agreement.

6. References

NSW Department of Environment and Conservation (2005) *Recovering bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland*. Hurstville

<http://www.environment.nsw.gov.au/resources/nature/RecoveringCumberlandPlain.pdf>

DECCW (2011) *Cumberland Plain Recovery Plan*. Department of Environment, Climate Change and Water (NSW), Sydney.

<http://www.environment.nsw.gov.au/resources/threatenedspecies/20100501CumberlandPlain.pdf>

Tozer M.G., Turner K., Keith D.A., Tindall D., Pennay C., Simpson C., MacKenzie B., Beukers P. and Cox S. (2010) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. *Cunninghamia* 11(3): 359-406

http://www.rbgsyd.nsw.gov.au/data/assets/pdf_file/0014/106214/Cun113Toz359.pdf

APPENDIX A:

Native plants recorded from the site

The following flora species were recorded from the Mater Dei biobank site between August 2011 and January 2012.

Cumberland Shale Hills Woodland	Cumberland River Flat Forest
<i>Ajuga australis</i>	<i>Acacia decurrens</i>
<i>Amyema miquelii</i>	<i>Aristida ramosa</i>
<i>Aristida ramosa</i>	<i>Aristida vagans</i>
<i>Aristida vagans</i>	<i>Arthropodium milleflorum</i>
<i>Asperula conferta</i>	<i>Austrodanthonia racemosa</i> var. <i>racemosa</i>
<i>Austrodanthonia racemosa</i> var. <i>racemosa</i>	<i>Austrostipa ramosissima</i>
<i>Austrodanthonia setacea</i>	<i>Brunoniella australis</i>
<i>Bothriochloa decipiens</i> var. <i>decipiens</i>	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>
<i>Brunoniella australis</i>	<i>Carex appressa</i>
<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	<i>Carex breviculmis</i>
<i>Carex appressa</i>	<i>Carex longibrachiata</i>
<i>Carex breviculmis</i>	<i>Cheilanthes austrotenuifolia</i>
<i>Carex gaudichaudiana</i>	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>
<i>Carex inversa</i>	<i>Chloris ventricosa</i>
<i>Carex longibrachiata</i>	<i>Commelina cyanea</i>
<i>Cayratia clematidea</i>	<i>Convolvulus erubescens</i>
<i>Cheilanthes austrotenuifolia</i>	<i>Cymbopogon refractus</i>
<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	<i>Cynodon dactylon</i>
<i>Chloris ventricosa</i>	<i>Cyperus imbecillis</i>
<i>Commelina cyanea</i>	<i>Desmodium varians</i>
<i>Cotula australis</i>	<i>Dichondra repens</i>
<i>Crassula sieberiana</i> subsp. <i>sieberiana</i>	<i>Einadia hastata</i>
<i>Cymbonotus lawsonianus</i>	<i>Einadia nutans</i> subsp. <i>nutans</i>
<i>Cymbopogon refractus</i>	<i>Elymus scaber</i> var. <i>scaber</i>
<i>Cynodon dactylon</i>	<i>Entolasia stricta</i>
<i>Cyperus enervis</i>	<i>Eragrostis brownii</i>
<i>Cyperus gracilis</i>	<i>Eragrostis leptostachya</i>
<i>Cyperus imbecillis</i>	<i>Eucalyptus baueriana</i>
<i>Daucus glochidiatus</i>	<i>Eucalyptus elata</i>
<i>Desmodium brachypodium</i>	<i>Eucalyptus tereticornis</i>
<i>Desmodium varians</i>	<i>Glycine clandestina</i>
<i>Dianella longifolia</i>	<i>Glycine tabacina</i>
<i>Dichelachne micrantha</i>	<i>Hibbertia diffusa</i>
<i>Dichondra repens</i>	<i>Hypericum gramineum</i>
<i>Einadia nutans</i> subsp. <i>linifolia</i>	<i>Lomandra confertifolia</i> subsp. <i>rubiginosa</i>
<i>Einadia nutans</i> subsp. <i>nutans</i>	<i>Microlaena stipoides</i> var. <i>stipoides</i>
<i>Einadia trigonos</i> subsp. <i>trigonos</i>	<i>Opercularia diphylla</i>
<i>Elymus scaber</i> var. <i>scaber</i>	<i>Oplismenus aemulus</i>
<i>Eragrostis leptostachya</i>	<i>Oplismenus imbecillis</i>
<i>Eucalyptus baueriana</i>	<i>Oxalis perennans</i>
<i>Eucalyptus moluccana</i>	<i>Pandorea pandorana</i> subsp. <i>pandorana</i>
<i>Eucalyptus tereticornis</i>	<i>Panicum effusum</i>
<i>Euchiton sphaericus</i>	<i>Phyllanthus gunnii</i>
<i>Fimbristylis dichotoma</i>	<i>Phyllanthus hirtellus</i>

Part 1: Site Description and Management Actions, July 2012

Cumberland Shale Hills Woodland	Cumberland River Flat Forest
<i>Galium migrans</i>	<i>Pratia purpurascens</i>
<i>Galium propinquum</i>	<i>Pseuderanthemum variabile</i>
<i>Geranium potentilloides</i> var. <i>potentilloides</i>	<i>Solanum prinophyllum</i>
<i>Geranium solanderi</i> var. <i>solanderi</i>	<i>Themeda australis</i>
<i>Glossocardia bidens</i>	<i>Tricoryne elatior</i>
<i>Glycine clandestina</i>	<i>Vernonia cinerea</i> var. <i>cinerea</i>
<i>Glycine tabacina</i>	<i>Veronica calycina</i>
<i>Hypericum japonicum</i>	<i>Wahlenbergia gracilis</i>
<i>Lagenophora gracilis</i>	
<i>Lagenophora gracilis</i>	
<i>Lomandra confertifolia</i> subsp. <i>rubiginosa</i>	
<i>Melaleuca decora</i>	
<i>Mentha satereioides</i>	
<i>Microlaena stipoides</i> var. <i>stipoides</i>	
<i>Opercularia diphylla</i>	
<i>Oplismenus imbecillis</i>	
<i>Oxalis perennans</i>	
<i>Pellaea falcata</i>	
<i>Phyllanthus virgatus</i>	
<i>Plantago gaudichaudii</i>	
<i>Plantago varia</i>	
<i>Poa labillardieri</i> var. <i>labillardieri</i>	
<i>Poa sieberiana</i> var. <i>sieberiana</i>	
<i>Ranunculus sessiliflorus</i> var. <i>sessiliflorus</i>	
<i>Rhodanthe anthemoides</i>	
<i>Schoenus paludosus</i>	
<i>Senecio quadridentatus</i>	
<i>Sida corrugata</i>	
<i>Solanum campanulatum</i>	
<i>Solanum prinophyllum</i>	
<i>Solenogyne dominii</i>	
<i>Sporobolus creber</i>	
<i>Themeda australis</i>	
<i>Vernonia cinerea</i> var. <i>cinerea</i>	
<i>Veronica calycina</i>	
<i>Veronica plebeia</i>	
<i>Vittadinia cuneata</i> var. <i>cuneata</i>	
<i>Wahlenbergia gracilis</i>	
<i>Wahlenbergia multicaulis</i>	
<i>Wahlenbergia stricta</i> subsp. <i>stricta</i>	
<i>Zornia dyctiocarpa</i> var. <i>dyctiocarpa</i>	

APPENDIX B:

Weed Zone profiles

Part 1: Site Description and Management Actions, July 2012

Weed Zone 1

Description	Three discrete areas of derived grassland in the southern section of the site, includes the road that runs along the southern boundary of the site.
Total area (ha)	1.97 ha
Management Zones	<ul style="list-style-type: none"> MZ1_SHW_NO CANOPY_REVEG (1.68 ha) MZ9_EASEMENT (0.29 ha)
Vegetation type	<ul style="list-style-type: none"> Shale Hills Woodland
Woody weeds and exotic vines	<ul style="list-style-type: none"> African Olive (very occasional)
Other weeds	<ul style="list-style-type: none"> Patchy dense growth of African Love Grass and <i>Briza subaristata</i>. Also present are Paspalum, Purpletop, Cobblers Pegs, Fireweed, Veined Verbena, Fleabane, Paddy's Lucerne. 11-40% foliage cover in western section of MZ1; 41-80% cover in other areas
Management objective	<ul style="list-style-type: none"> Establish a native canopy and shrub layer where natural regeneration is not occurring Eliminate any exotic vines, succulents and woody weeds and prevent their re-establishment Reduce the percentage foliage cover of groundcover weeds to moderate levels by Year 5 and low levels by Year 10.
Proposed works (Years 1-5)	<p><u>Revegetation using tree and shrub species (MZ1 only)</u></p> <ul style="list-style-type: none"> Supplementary planting of tree and shrub species within 48 months of commencement. <ul style="list-style-type: none"> See attached planting schedule for details of the numbers and species to be planted. Plant trees at a rate of 400 trees/ha over approximately 50% of MZ1 (i.e. total of 340 trees) Plant shrubs at a rate of 625 shrubs/ha over approximately 50% of MZ1 (i.e. total of 520 shrubs) Avoid planting within 10 m of existing canopy trees Install tree guards around each plant and maintain for 3 years from planting date Plant in a mosaic pattern to maintain a patchwork of open grassland areas within the zone. Undertake on-going maintenance of plantings to achieve a minimum 85% survival rate. <p><u>Weed control</u></p> <ul style="list-style-type: none"> Targeted treatment of all exotic vines, succulents and woody weeds at least three times p.a. Slashing, spot spraying and/or hand weeding of other weeds at least three times p.a. to reduce weed biomass and assist the establishment and spread of native species.
5 year performance measures	<ul style="list-style-type: none"> 520 native shrubs and 330 native trees established across zone No mature exotic vines and woody weeds present Groundcover weed density reduced to <10% foliage cover in western section of MZ1 Groundcover weed density reduced to <30% foliage cover elsewhere in MZ1 and MZ9
Proposed works (Year 6 onwards)	<p><u>Weed control</u></p> <ul style="list-style-type: none"> Targeted treatment of all exotic vines, succulents and woody weeds at least three times p.a. Slashing, spot spraying and/or hand weeding of other weeds at least three times p.a. to reduce weed biomass and assist the establishment and spread of native species.
10 year performance measures	<ul style="list-style-type: none"> No mature exotic vines or woody weeds present Groundcover weed density at <10% foliage cover across MZ1 and MZ9



Weed Zone 2

Description	Core area of woodland with lower levels of weed infestation.
Total area (ha)	13.20 ha
Management Zones	<ul style="list-style-type: none"> MZ2_SHW_LOW WEED (11.43 ha) MZ7_RFF_LOW WEED (1.77 ha)
Vegetation type	<ul style="list-style-type: none"> Shale Hills Woodland in MZ2, River Flat Forest in MZ7.
Woody weeds and exotic vines	<ul style="list-style-type: none"> African Olive, African Boxthorn, Lantana, Bridal Creeper, Moth Vine Variable but <40% foliage cover
Other weeds	<ul style="list-style-type: none"> African Love Grass, Paspalum, Paddies Lucerne, Blackberry Nightshade, Purpletop, Fleabane, Catsear, Lambs Tongue, Cobblers Pegs, Fireweed, Thistle Variable but <10% foliage cover
Management objective	<ul style="list-style-type: none"> Eliminate all exotic vines, succulents and woody weeds and prevent their re-establishment Reduce and maintain the cover of other weeds to low levels by Year 5 Redistribute the large log piles that occur across the zone
Proposed works (Years 1-5)	<p><u>Weed control</u></p> <ul style="list-style-type: none"> Staged primary weed treatment of approximately 50% of zone p.a. Use cut/paint, scrape/paint, drill/poison, hand-weeding, slashing and spot-spraying techniques as appropriate Pile woody debris as per RFS standards for burn piles. Undertake follow up weeding of all areas previously worked at least three times p.a. Prioritise mature individuals for treatment at all times. <p><u>Other</u></p> <ul style="list-style-type: none"> For the existing large log piles within the zone: <ul style="list-style-type: none"> Redistribute large logs (>30 cm diameter) across nearby areas using a positrack bobcat under supervision of qualified ecologist or bush regenerator
5 year performance measures	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Groundcover weed density maintained at <10% foliage cover throughout zone Large logs from piles distributed across nearby areas Any burn piles present are consistent with RFS standards for burn piles
Proposed works (Year 6 onwards)	<p><u>Weed control</u></p> <ul style="list-style-type: none"> Undertake follow up weeding of all areas at least three times p.a.
10 year performance measures	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Groundcover weed density maintained at <10% foliage cover



Part 1: Site Description and Management Actions, July 2012

Weed Zone 3

Description	Six discrete areas of degraded woodland with high levels of woody weed infestation.
Total area (ha)	2.72 ha
Management Zones	<ul style="list-style-type: none"> MZ3_SHW_MODERATE WW
Vegetation type	<ul style="list-style-type: none"> Shale Hills Woodland
Woody weeds and exotic vines	<ul style="list-style-type: none"> African Olive, African Boxthorn, Lantana, Jerusalem Cherry, Bridal Creeper, Moth Vine 41-80% foliage cover
Other weeds	<ul style="list-style-type: none"> Paspalum, Purpletop, Panic Veldt Grass, Fireweed, Blackberry Nightshade, Thistle, Fleabane, Paddies lucerne, African Love Grass, , Catsear, Lambs Tongue, Cobblers Pegs, Variable but <10% foliage cover
Management objective	<ul style="list-style-type: none"> Eliminate all exotic vines, succulents and woody weeds and prevent their re-establishment Reduce and maintain the cover of other weeds at low levels Redistribute the large log piles that occur across the zone
Proposed works (Years 1-5)	<p><u>Weed control</u></p> <ul style="list-style-type: none"> Staged primary weed treatment of approximately 50% of zone p.a. Use drill and poison or basal bark spray methods on very large woody weeds (>300 mm DBH), use cut and poison method on smaller individuals. Use a combination of slashing, spot spraying and hand weeding on other weeds Pile woody debris as per RFS standards for burn piles. Prioritise mature individuals for treatment at all times. Undertake follow up weeding at least three times p.a. in all areas previously worked <p><u>Other</u></p> <ul style="list-style-type: none"> For the existing large log piles within the zone: <ul style="list-style-type: none"> Redistribute large logs (>30 cm diameter) across nearby areas using a positrack bobcat under supervision of qualified ecologist or bush regenerator
5 year performance measures	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Groundcover weed density maintained at <10% foliage cover throughout
Proposed works (Year 6 onwards)	<p><u>Weed control</u></p> <ul style="list-style-type: none"> Undertake follow up weeding at least three times p.a.
10 year performance measures	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Groundcover weed density maintained at <10% foliage cover



Part 1: Site Description and Management Actions, July 2012

Weed Zone 4

Description	Six discrete areas of degraded woodland with very high levels of woody weed infestation.
Total area (ha)	7.80 ha
Management Zones	<ul style="list-style-type: none"> • MZ5_SHW_DENSE WW (1.32 ha) • MZ6_SHW_LOW CONDITION_REVEG (0.51 ha) • MZ8_RFF_DENSE WW (0.16 ha) • MZ10_SHW_DENSE WW_REVEG (2.12 ha) • MZ11_RFF_DENSE WW_REVEG (3.69 ha)
Vegetation type	<ul style="list-style-type: none"> • Shale Hills Woodland in MZ5, MZ6 and MZ10, River Flat Forest in MZ8 and MZ11
Woody weeds and exotic vines	<ul style="list-style-type: none"> • African Olive, Small Leaved Privet, Large Leaved Privet, Honey Locust, African Boxthorn, Lantana, Jerusalem Cherry, Bridal Creeper, Moth Vine, Madeira Vine. • >80% foliage cover
Other weeds	<ul style="list-style-type: none"> • Wandering Jew, Panic Veldt Grass, African Love Grass, Blackberry Nightshade, Paspalum, Purpletop, Fireweed, Thistle, Fleabane, Paddies Lucerne, Catsear, Lambs Tongue, Cobblers Pegs, • Variable but <10% foliage cover
Management objective	<ul style="list-style-type: none"> • Gradually eliminate all exotic vines, succulents and woody weeds and prevent their re-establishment • Maintain the cover of other weeds at low levels • Prevent erosion • Assist the establishment of a dense native understorey and a native mid-storey and canopy where required through supplementary planting
Proposed works (Years 1-5)	<p><u>Weed control (all zones)</u></p> <ul style="list-style-type: none"> • Targeted treatment of exotic vines and succulents within 12 months of commencement. • Staged primary weed treatment of approx. 20% of the combined area of the zones every two years • Progress primary work from the edges of adjacent better condition areas to facilitate / maximise native species regeneration and minimise erosion on slopes. • Use drill and poison or basal bark spray methods on very large woody weeds (>300 mm DBH), use cut and poison method on smaller individuals. Use a combination of slashing, spot spraying and hand weeding on other weeds • Pile woody debris as per RFS standards for burn piles. • Undertake follow up weeding in all areas previously worked at least four times p.a. <p><u>Additional weed control actions for MZ6, MZ10 & MZ11</u></p> <ul style="list-style-type: none"> • Mechanical primary treatment of African Olive can be undertaken on accessible low gradient slopes. Use a barrel mulcher and manually re-cut and poison woody weed stumps immediately after mulching. • In more sensitive areas (i.e. steep slopes, within 2m of remnant trees, and within 25 m of river), use cut/poison, drill/poison and basal bark spray technique as appropriate. <p><u>Erosion control</u></p> <ul style="list-style-type: none"> • Strategically place African Olive logs and branches across steep slopes and gullies in MZ10 and MZ11 and fix them in place using wooden stakes • Ensure sufficient native plant cover is present within previously cleared areas prior to continuing primary weed treatment in that area. <p><u>Revegetation using tree and shrub species (for MZ6, MZ10 & MZ11 only)</u></p> <ul style="list-style-type: none"> • Supplementary planting of tree and shrub species within 24 months of primary weed treatment. <ul style="list-style-type: none"> - See attached planting schedule for details of the numbers and species to be planted. - Plant trees at a rate of 400 trees/ha over approximately 50% of each zone (i.e. total of 1260 trees over 10 years) - Plant shrubs at a rate of 625 shrubs/ha over approximately 50% of each zone (i.e. total of 1980 shrubs over 10 years)

Part 1: Site Description and Management Actions, July 2012

Proposed works (Years 1-5) continued	<ul style="list-style-type: none"> • Avoid planting within 10 m of existing canopy trees or where strong natural regeneration is occurring • Install tree guards around each plant and maintain for 3 years from planting date • Undertake on-going maintenance of plantings to achieve a minimum 85% survival rate. <p><u>Revegetation of groundcover species (for MZ6, MZ10 & MZ11 only)</u></p> <ul style="list-style-type: none"> • Supplementary planting of fast-establishing provenance grass / groundcover within 24 months of primary weed treatment in order to accelerate the establishment of native species cover <ul style="list-style-type: none"> - Plant groundcovers in nodes covering one square metre and containing six plants - Install 200 nodes per hectare targeting areas with the lowest capacity for natural regeneration (i.e. a total of 7560 plants over 10 years) • Ongoing maintenance of plantings to achieve a minimum 85% survival rate
5 year performance measures	<ul style="list-style-type: none"> • No mature exotic vines present • Primary weed treatment completed for at least 40% of the zone • Groundcover weed density maintained at <10% foliage cover in all areas previously treated • 170 native trees/ha and 250 native shrubs/ha established in areas that have been treated for >3 years • >20% foliage cover of native groundcovers in areas that have been treated for >4 years
Proposed works (Year 6 onwards)	<p><u>Weed control</u></p> <ul style="list-style-type: none"> • Continued staged primary weed treatment of approx. 20% of the combined area of the zones every two years (as for Years 1 to 5) • Undertake follow up weeding in all areas previously worked at least four times p.a. <p><u>Additional weed control actions in MZ6, MZ10 & MZ11</u></p> <ul style="list-style-type: none"> • as for Years 1 to 5 <p><u>Erosion control</u></p> <ul style="list-style-type: none"> • as for Years 1 to 5 <p><u>Revegetation using tree and shrub species (for MZ6, MZ10 & MZ11 only)</u></p> <ul style="list-style-type: none"> • as for Years 1 to 5 <p><u>Revegetation of groundcover species (for MZ6, MZ10 & MZ11 only)</u></p> <ul style="list-style-type: none"> • as for Years 1 to 5
10 year performance measures	<ul style="list-style-type: none"> • No mature exotic vines or woody weeds present • Groundcover weed density maintained at <10% foliage cover throughout • 170 native trees/ha and 250 native shrubs/ha established in areas that have been treated for >3 years • >20% foliage cover of native groundcovers in areas that have been treated for >4 years



Weed Zone 5

Description	Narrow highly degraded strip along eastern boundary that is dominated by understorey weeds
Total area (ha)	0.40 ha
Management Zones	<ul style="list-style-type: none"> MZ4_SHW_DENSE GW
Vegetation type	<ul style="list-style-type: none"> Shale Hills Woodland
Woody weeds and exotic vines	<ul style="list-style-type: none"> African Olive, African Boxthorn, Lantana, Jerusalem Cherry, Bridal Creeper, Moth Vine 11-30% foliage cover
Other weeds	<ul style="list-style-type: none"> Rhodes Grass, African Love Grass, Paspalum, Purpletop, Fireweed, Thistle, Fleabane, Paddies Lucerne, Catsear, Lambs Tongue, Cobblers Pegs >80% foliage cover
Management objective	<ul style="list-style-type: none"> Eliminate all exotic vines, succulents and woody weeds and prevent their re-establishment Reduce the cover of other weeds to moderate levels by Year 5 and low levels by Year 10
Proposed works (Years 1-5)	<p><u>Weed control</u></p> <ul style="list-style-type: none"> Target weeding of exotic vines and woody weeds within 6 months of commencement Slashing, spot-spraying and/or handweeding at least four times p.a. to reduce weed cover and assist the establishment and spread of native groundcovers.
5 year performance measures	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Groundcover weed density reduced to <30% foliage cover
Proposed works (Year 6 onwards)	<p><u>Weed control</u></p> <ul style="list-style-type: none"> Slashing, spot-spraying and/or handweeding four times p.a. to reduce weed cover and assist the establishment of native ground covers
10 year performance measures	<ul style="list-style-type: none"> No mature exotic vines, succulents or woody weeds present Groundcover weed density reduced to <20% foliage cover



APPENDIX C:

Exotic plants recorded from the site

Part 1: Site Description and Management Actions, July 2012

Weed	Common name of target weed	Scientific name of target weed	Description of infestation (eg intensity (% cover) & location within zone)	Management zone/s
Woody weed	Green Cestrum	<i>Cestrum parqui</i>	Scattered individuals in disturbed riparian zone	MZ11
Woody weed	Honey Locust	<i>Gleditsia triacanthos</i>	Scattered individuals throughout site	ALL
Woody weed	Lantana	<i>Lantana camara</i>	Minor infestations in CSHW and CRFF, large infestation dominates MZ8	ALL
Woody weed	Large Leaved Privet	<i>Ligustrum lucidum</i>	Scattered individuals in highly disturbed areas of CSHW and CRFF	MZ5; MZ10; MZ11
Woody weed	Small Leaved Privet	<i>Ligustrum sinense</i>	Significant infestations in highly disturbed areas of CSHW and CRFF	MZ5; MZ10; MZ11
Woody weed	African Olive	<i>Olea europaea ssp. cuspidata</i>	Widespread across site, with significant infestations in highly disturbed areas of CSHW and CRFF	ALL
Woody weed	African Boxthorn	<i>Lycium ferocissimum</i>	Scattered individuals and minor infestations in most SHW zones	MZ2; MZ3; MZ4, MZ5
Succulent	Common Prickly Pear	<i>Opuntia stricta</i>	Scattered individuals throughout site	ALL
Succulent	Wandering Jew	<i>Tradescantia fluminensis</i>	Minor infestations in disturbed riparian zone	MZ12
Exotic vine	Madeira Vine	<i>Anredera cordifolia</i>	Large infestation near northern boundary of site	MZ10
Exotic vine	Moth Vine	<i>Araujia sericifera</i>	Scattered individuals throughout site	ALL
Exotic vine	Bridal Creeper	<i>Asparagus asparagoides</i>	Scattered individuals throughout site	ALL
Exotic vine	Honeysuckle	<i>Lonicera sp</i>	Minor infestations in disturbed riparian zone	MZ8
Exotic grass	Carpet Grass	<i>Axonopus fissifolius</i>	Minor infestation throughout site	ALL
Exotic grass	Chilean Quaking Grass	<i>Briza subaristata</i>	Minor infestations in areas of SHW, significant infestations in areas without canopy.	MZ1; MZ2; MZ3; MZ4; MZ5
Exotic grass	Ehrharta	<i>Ehrharta erecta</i>	Minor infestations throughout site	ALL
Exotic grass	African Love Grass	<i>Eragrostis curvula</i>	Minor infestations throughout site	ALL
Exotic grass	Common Paspalum	<i>Paspalum dilatatum</i>	Minor infestations throughout site, significant infestations in areas without canopy.	ALL
Exotic grass	Kikuyu	<i>Pennisetum clandestinum</i>	Minor infestations in more open parts of SHW	MZ1; MZ2; MZ4
Exotic grass	Pidgeon Grass	<i>Setaria gracilis</i>	Minor infestations in more open parts of SHW	MZ1; MZ2; MZ4

Part 1: Site Description and Management Actions, July 2012

Weed	Common name of target weed	Scientific name of target weed	Description of infestation (eg intensity (% cover) & location within zone)	Management zone/s
Exotic grass	Parramatta Grass	<i>Sporobolus africanus</i>	Scattered individuals in most SHW zones	MZ1; MZ2; MZ3; MZ4
Exotic grass	Squirrel Tail Fescue	<i>Vulpia myuros</i>	Minor infestations in parts of SHW without canopy	MZ1
Exotic forb	Pimpernel	<i>Anagallis arvensis</i>	Scattered individuals in more open parts of SHW	MZ1; MZ2; MZ4
Exotic forb	Climbing Asparagus	<i>Asparagus aethiopicus</i>	Minor infestations in more disturbed parts of site	MZ3; MZ5; MZ11
Exotic forb	Cobblers Peg	<i>Bidens spp</i>	Scattered individuals and minor infestations throughout site	ALL
Exotic forb	Fat Hen	<i>Chenopodium album</i>	Scattered individuals in SHW	MZ2
Exotic forb	Spear Thistle	<i>Cirsium vulgare</i>	Scattered individuals in SHW	MZ2; MZ3; MZ4
Exotic forb	Slender Celery	<i>Cyclospermum leptophyllum</i>	Scattered individuals in more open parts of SHW	MZ1; MZ2; MZ4
Exotic forb	Fleabane	<i>Conyza sp.</i>	Scattered individuals and minor infestations throughout site	ALL
Exotic forb	Gomphrena Weed	<i>Gomphrena celosioides</i>	Scattered individuals in SHW	MZ2
Exotic forb	Flatweed	<i>Hypochaeris spp</i>	Scattered individuals throughout site	ALL
Exotic forb	Slender Birds-foot Trefoil	<i>Lotus angustissimus</i>	Minor infestations in parts of SHW without canopy	MZ1
Exotic forb	Medics	<i>Medicago spp</i>	Scattered individuals in SHW	MZ2
Exotic forb	Brazilian Whitlow	<i>Paronychia brasiliiana</i>	Scattered individuals throughout site	ALL
Exotic forb	Lamb's Tongue	<i>Plantago lanceolata</i>	Scattered individuals and minor infestations throughout site	ALL
Exotic forb	Mexican Clover	<i>Richardia brasiliensis</i>	Scattered individuals throughout site	ALL
Exotic forb	Fireweed	<i>Senecio madagascariensis</i>	Scattered individuals throughout site	All
Exotic forb	Paddy Lucerne	<i>Sida rhombifolia</i>	Scattered individuals throughout site	ALL
Exotic forb	Black Nightshade	<i>Solanum nigrum</i>	Scattered individuals throughout site	ALL
Exotic forb	Sowthistle	<i>Sonchus spp</i>	Scattered individuals throughout site	ALL
Exotic forb	Stinking Roger	<i>Tagetes minuta</i>	Scattered individuals in SHW	MZ2
Exotic forb	Clover	<i>Trifolium spp</i>	Scattered individuals and minor infestations in more open parts of SHW	MZ1; MZ2; MZ4
Exotic forb	Purpletop	<i>Verbena spp</i>	Scattered individuals throughout site	ALL

APPENDIX D:

Annual Monitoring Proforma for Management Zones

MATER DEI BIOBANK SITE: ANNUAL MONITORING PROFORMA FOR MANAGEMENT ZONES

Management Zone:

Date:

Completed by:

SECTION A (to be completed in the field)

Condition of Zone

For each management sub-zone, record each measure as either A (absent), O (occasional), M (moderate) or F(frequent)

	MSZa	MSZb	MSZc	MSZd	MSZe	MSZf
Regeneration of native canopy species						
Regeneration of native shrub species						
Regeneration of native groundcovers						
Canopy dieback						
Evidence of erosion						

Visual estimate of weediness

For each management sub-zone, record a visual estimate of percentage foliage cover (0-100%) for each weed class

	MSZa	MSZb	MSZc	MSZd	MSZe	MSZf
Woody weeds and exotic climbers						
Exotic groundcovers						

Description of main weed infestations

Describe the main weeds that are present in the management zone (name & extent):

Formal monitoring of groundcover weeds

Establish a 50 m transect through the most weed affected part of the management zone where weed control work has occurred. At 50 cm intervals along the transect (100 points in total) place a 1m long thin stick on the ground (upright) and record whether weed species or native species (or both) are in contact with the stick. At each point, score 1 if weed species only are in contact with the stick, score 0.5 if both native and weed species are in contact with the stick, or score 0 if there are no weed species in contact with the stick. Record the percentage foliage cover (PFC) as the sum of these values divided by 100.

MSZ where the transect was located:		PFC recorded:	
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Feral pests

For each MSZ, record the extent of active rabbit burrows as either N (negligible), Min (minimal), Mod (moderate) or High (high)

	MSZa	MSZb	MSZc	MSZd	MSZe	MSZf
Active rabbit burrows						

Provide details of any evidence of other feral pests observed:

Threatened species

Provide details of any threatened species observed:

Management Zone:

Date:

Completed by:

SECTION B (to be completed in the office)

Weed Control Summary

Provide a brief summary of the weed control works undertaken in this previous 12 months:

Provide a brief assessment of whether the weed control techniques used were succesful :

Provide recommendations for next year's weed control works in this management zone:

Other comments

Provide any other comments on the condition or proposed works in this management zone:

APPENDIX E:

Annual Reporting Proforma for Feral Pests

MATER DEI BIOBANK SITE: ANNUAL REPORTING PROFORMA FOR FERAL PESTS

Date:

Completed by:

Management sub-zone	Number of active rabbit burrows treated in previous year (record as N/A if no treatment has occurred)	Extent of active rabbit burrows remaining (record as negligible, minimal, moderate or high - refer to annual monitoring proforma for management zones)	Priority for future treatment (priorities are to be numbered from 1 upward, with 1 being the highest priority, or N/A if not applicable)
MSZ 1a			
MSZ 1b			
MSZ 1c			
MSZ 2a			
MSZ 3a			
MSZ 3b			
MSZ 3c			
MSZ 3d			
MSZ 3e			
MSZ 3f			
MSZ 4a			
MSZ 5a			
MSZ 5b			
MSZ 5c			
MSZ 6a			
MSZ 7a			
MSZ 8a			
MSZ 9a			
MSZ 10a			
MSZ 11a			
Total			

Observations of other feral pests in previous year

Include description of other feral pests observed (traces or sightings) and a qualitative indication of the number of occurrences as being either Negligible (N), Minimal (Min), Moderate (Mod) or High (H)

Other feral pest control activities completed in previous year

Include description of any feral pests activities other than rabbit burrow treatment implemented in previous year

Priorities for feral pest control in the next year

Include discussion of whether control of other feral pests is greater than the priorities for rabbit burrow treatment indicated overleaf but note that rabbit burrow treatment must be undertaken if the number of active rabbit burrows is recorded as being moderate or high in the annual monitoring proforma for management zones

Summary for previous year

a) Total funds available for feral pest control at start of year	
b) Funds spent on treatment of rabbit burrows during year	
c) Funds spent on other feral pest control during year	
d) Total funds spent on feral pest control during year (b+c)	
e) Remaining funds for feral pest control (a-d)	

Cumulative totals since commencement of agreement (refer to previous reports)

Total funds received from OEH for feral pest control to date	
Total funds spent on feral pest control to date	

APPENDIX F:

Photo-monitoring locations

Locations of photo points			
Projected coordinate system: GDA 94 Zone 56			
Photo point reference	Easting	Northing	Direction of photo (magnetic degrees)
MD_01	287052	6232494	110
MD_02	287074	6232866	50
MD_03	287431	6232485	184
MD_04	287164	6232396	210
MD_05	286970	6232965	45
MD_06	287376	6232554	200
MD_07	287103	6232795	160
MD_08	286962	6232431	60
MD_09	287039	6232671	205
MD_10	287522	6232444	40

APPENDIX G:

Photo-points in March 2011

MD_01



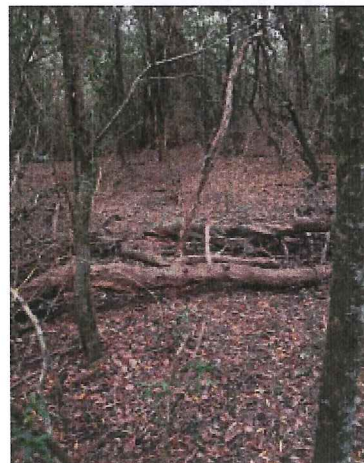
MD_04



MD_02



MD_05



MD_03



MD_06



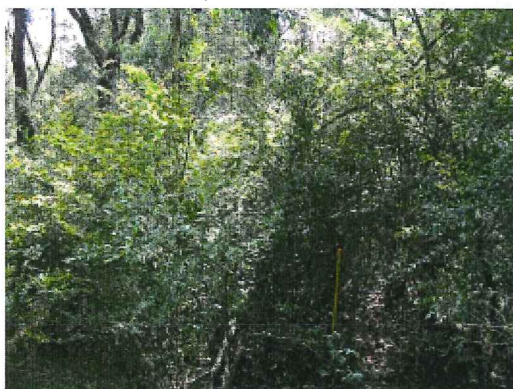
MD_07



MD_09



MD_08



MD_10 (no photo)

APPENDIX H:

Inspection Checklist

MATER DEI BIOBANK SITE: INSPECTION CHECKLIST

SECTION A (to be completed every 6 months in December and June)

Completed by:

Date:

Is there evidence of livestock being present on the biobank site in the last six months? (YES / NO)

If Yes, provide a brief description. Attach photos and mark the location on a map.

Is there evidence of waste/rubbish dumping on the biobank site? (YES / NO)

If Yes, provide a brief description. Attach photos and mark the location on a map.

Is there evidence of human disturbance on the biobank site? (YES / NO)

If Yes, provide a brief description. Attach photos and mark the location on a map.

Is there evidence of active erosion on the biobank site? (YES / NO)

If Yes, provide a brief description. Attach photos and mark the location on a map.

SECTION B (to be completed annually in June)

Completed by:

Date:

Are the fences & gates capable of preventing livestock from entering the biobank site? (YES / NO)

If No, provide a brief description. Attach photos and mark the location on a map.

Is one legible BioBanking sign attached to each of the five gates into the biobank site? (YES / NO)

If No, describe the location of the sign/s that need replacing or mark location on a map

Are 15 legible BioBanking signs attached to starpickets along the boundary of biobank site? (YES / NO)

If No, describe the location of the sign/s that need replacing or mark location on a map

Are there two legible interpretation signs on the boundary of the biobank site? (YES / NO)

If No, describe the location of the sign/s that need replacing or mark location on a map

Have photos been taken at each of the locations and in the directions specified below? (YES / NO)

Photo point	Easting	Northing	Direction (magnetic)	Date taken
MD_01	287052	6232494	110°	
MD_02	287074	6232866	50°	
MD_03	287431	6232485	184°	
MD_04	287164	6232396	210°	
MD_05	286970	6232965	45°	
MD_06	287376	6232554	200°	
MD_07	287103	6232795	160°	
MD_08	286962	6232431	60°	
MD_09	287039	6232671	205°	
MD_10	287522	6232444	40°	

APPENDIX I:

Annual Report Template

Biobank site annual report

Location details

Biobanking agreement ID: 81
Reporting date: 4 July

Name of landowner/s: Trustees of the Sisters of the Good Samaritan
Property address: 229 Macquarie Grove Road, Cobbitty, NSW, 2570

Records of management actions undertaken

Management action	Required completion time and frequency	Action completed (Yes/No)	Actual completion date/s	Description of actions undertaken including where undertaken (including reference to management zones), any variations and the reasons for variation)	Visual observations and other comments (including reasons for non completion)
1 Management of grazing for conservation					
2 Weed control					
3 Management of fire for conservation					
4 Management of human disturbance					
5 Retention of native vegetation					
6 Planting or seeding					
7 Retention of dead timber					
8 Erosion control					

9	Retention of rocks					
10	Control of feral and overabundant native herbivores					
11	Vertebrate pest management					
Incident or event that has adverse effect on biodiversity values on biobank site						
Incident or event including adverse impacts (e.g. natural events)				Action taken and proposed recommended actions		
Records submitted with this report						
<input type="checkbox"/> Photographs taken at the photo points set in the biobanking agreement.						
<input type="checkbox"/> Results of the inspections required to be conducted in item 1.2 of Annexure D to the biobanking agreement.						
<input type="checkbox"/> Results of any monitoring, inspections or surveys required in Annexures C and D to the biobanking agreement.						
Signature and certification						
I hereby declare that the information supplied in this report is accurate and complies with the reporting requirements under item 2 of the Annexure D to the biobanking agreement. Note: If the land that forms the biobank site is owned by multiple persons, each landowner must sign this annual report.						
Signed				Signed		
Date				Date		

