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A COMPARISON OF THE COST OF SECURING BIODIVERSITY OFFSETS FOR THE M7 USING BIODIVERSITY CREDITS

A report prepared for the Department of Environment, Climate Change and Water and the Roads and Traffic Authority

8 February 2010





An comparison of the cost of secure biodiversity offsets for the M7 using Biodiversity credits

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Contents

Contents	iii
List of Tables	vi
List of Figures	vii
Abbreviations	vii
Executive Summary	1
1 Introduction	3
1.1 Objective of Stage 2 of the Study	3
1.2 Background	3
1.3 Assumptions and limitations of this study	4
2 Number of Credits required to offset biodiversity losses associated with the M7	6
3 Number of Credits generated at approved M7 offset sites	8
4 Description of offset sites & basis of management costs	10
4.1 Colebee	10
4.1.1 Site Description	10
4.1.2 Key Management Issues	11
4.1.3 Fencing	11
4.1.4 Tracks and Trails	11
4.1.5 Rehabilitation and Weed Management	11
4.1.6 Ecological Burns	11
4.1.7 Feral Animal Management	12
4.2 Kemps Creek	14
4.2.1 Site Description	14
4.2.2 Key Management Issues	14
4.2.3 Fencing	14
4.2.4 Tracks and Trails	15

4.2.5	Rehabilitation and Weed Management	15
4.2.6	Ecological Burns	15
4.2.7	Feral Animal Management.....	15
4.3	Girl Gudies	17
4.3.1	Site Description.....	17
4.3.2	Key Management Issues	17
4.3.3	Fencing	18
4.3.4	Tracks and Trails	18
4.3.5	Rehabilitation and Weed Management	18
4.3.6	Ecological Burns	18
4.3.7	Feral Animal Management.....	18
4.4	Bents Basin	20
4.4.1	Site Description.....	20
4.4.2	Key Management Issues	20
4.4.3	Fencing	21
4.4.4	Tracks and Trails	21
4.4.5	Rehabilitation and Weed Management	21
4.4.6	Ecological Burns	21
4.4.7	Feral Animal Management.....	21
4.5	Horsley	23
4.5.1	Site Description.....	23
4.5.2	Key Management Issues	23
4.5.3	Fencing	23
4.5.4	Tracks and Trails	24
4.5.5	Rehabilitation and Weed Management	24
4.5.6	Ecological Burns	24
4.5.7	Feral Animal Management.....	24
4.6	Rouse Hill.....	26
4.6.1	Site Description.....	26
4.6.2	Key Management Issues	26
4.6.3	Fencing	26
4.6.4	Tracks and Trails	27
4.6.5	Rehabilitation and Weed Management	27
4.6.6	Ecological Burns	27
4.6.7	Feral Animal Management.....	27
5	Estimating the In Perpetuity Cost of management and potential Credit sales price.....	29
5.1	In perpetuity Management costs (Credit Cost part A).....	30
5.1.1	Initial Management requirements prior to land transfers	30

5.1.2	Grazing Management/Human Disturbance (Fencing).....	31
5.1.3	Management trail establishment and/or removal.....	32
5.1.4	Rehabilitation and Weed Management	33
5.1.5	Ecological Burns for Biodiversity	33
5.1.6	Feral Animal Control	33
5.2	Other Costs (Credit Cost Part B)	34
5.2.1	Biobank Assessment & Registration Costs	34
5.2.2	Council Rates.....	34
5.2.3	Livestock Health and Pest Authority (LHPA) Rates.....	35
5.2.4	Administrative Costs	35
5.3	Credit Sales Price	35
5.3.1	Ecosystem Credits.....	35
5.3.2	Species Credits.....	37
6	Costs to secure Biodiversity Credits for the M7	40
6.1	Purchase of all Ecosystem credits generated.....	40
6.2	Purchase required number of ecosystem credits	41
6.3	Purchase of Species credits	42
6.4	Modified Ecosystem Credit prices.....	43
7	Conclusions.....	45
	Glossary of Biobanking Terminology.....	47
	References	50
	Appendix 1: Compensatory habitat requirements for M7 approval.....	51
	Appendix 2: Credit reports for M7 impact sites	53
	Appendix 3: Credit reports for Biobank sites.....	68
	Appendix 4: In perpetuity costs of management for each offset site	93

List of Tables

Table 1 Cost to meet DECCW Offset requirements as specified in the concurrence decision for the M7 4	
Table 2 Summary of credits required to offset the biodiversity impacts of the M7.....	7
Table 3 Number of Ecosystem Credits generated at each offset site.....	9
Table 4 No of Species Credits generated at each offset Site.....	9
Table 5: Vegetation Zones and Extent within the Colebee Offset Site.....	10
Table 6: Vegetation Zones and Extent within the Kemps Creek Offset Site.....	14
Table 7: Vegetation Zones and Extent within the Gulguer Offset Site.....	17
Table 8: Vegetation Zones and Extent within the Bents Basin Offset Site.....	20
Table 9: Vegetation Zones and Extent within the Horsley Offset Site.....	23
Table 10: Vegetation Zones and Extent within the Rouse Hill Offset Site.....	26
Table 11 Estimates of the costs to formally assess and register the subject Biobank sites.....	34
Table 12 Ecosystem credit prices per credit generated.....	36
Table 13 Suggested prices for species credits.....	38
Table 14 Reduced Ecosystem Credit prices after combining cost of Ecosystem and Species Credits into TFD.....	39
Table 15 Cost to secure all Ecosystem Credits generated at the six M7 Offset sites.....	40
Table 16 Cost to secure required number of ecosystem credits assuming correct type & number of credits are available.....	41
Table 17 Cost to purchase all required ecosystem credits of the correct type (Mgt Cost only).....	42
Table 18 Cost to secure required number of species credits.....	42
Table 20 Cost to secure required number of ecosystem credits assuming correct type & number of credits are available after deducting value of species credits.....	43
Table 21 Cost to purchase all available ecosystem credits of the correct type (Mgt Cost only) after deducting value of species credits.....	44

List of Figures

Figure 1: Colebee Site and Selected Management Actions.....	13
Figure 2: Kemps Creek Site and Selected Management Actions.....	16
Figure 3: Girl Guides Site and Selected Management Actions.....	19
Figure 4: Bents Basin Site and Selected Management Actions.....	22
Figure 5: Horsley Site and Selected Management Actions.....	25
Figure 6: Rouse Hill Site and Selected Management Actions.....	28
Figure 7 Ecosystem credit prices in relation to Biobank size and land value	37
Figure 8 Ecosystem Credit price in relation to proportion of land value included in credit price.....	37

Abbreviations

ABBREVIATION	DESCRIPTION
Assessment Methodology	Biobanking Assessment Methodology
DECC	Department of Environment & Climate Change (now DECCW)
DECCW	Department of Environment, Climate Change and Water (formerly DECC)
NPWS	NSW National Parks and Wildlife Service (now part of the DECCW)
Operational Manual	Biobanking Assessment Methodology and Credit Calculator Operational Manual
RTA	NSW Roads and Traffic Authority
TFD	Total Fund Deposit
TSC Act	Threatened Species Conservation Act

Executive Summary

The NSW Roads and Traffic Authority (RTA) received approval for the M7 Motorway in August 2001. The motorway, stretching some 39 kilometres from Liverpool to west Baulkham Hills resulted in the loss of 72 hectares (ha) of three endangered ecological communities. As a condition of approval, the RTA was required to negotiate a compensatory habitat package with the DG of the then National Parks and Wildlife Service to offset the impacts on biodiversity loss.

Between 2001 and 2009, the RTA purchased and dedicated to the National Parks estate, six properties across western Sydney with high biodiversity value totalling 132 ha in area. This offset package (land purchase, land management expenses and investigations undertaken by the RTA) cost approximately \$18.125M and took nearly 8 years to finalise.

In 2006, legislative amendments to the *Threatened Species Conservation Act* introduced the NSW Biodiversity Banking (BioBanking) Scheme. The Biobanking Scheme provides a simple and transparent framework for the assessment of offset requirements at development sites and the dedication of land as Biobank sites which would be managed for conservation and generate improvements in biodiversity values to offset these impacts. The scheme provides for a more rapid assessment of offset requirements and a simpler means of securing offsets via the purchase of biodiversity credits at market prices (DECC 2007). The scheme became operational in late 2008.

The Department of Environment, Climate Change and Water (DECCW) commissioned this study to investigate what the biodiversity offsets for the M7 motorway may have cost using the now available Biobanking provisions.

An assessment of the biodiversity impacts of the motorway by DECCW determined that 2,946 ecosystem credits representing three vegetation communities and four species credits would be required. The six offset sites purchased by the RTA, had they been registered as Biobank sites, would have generated 1,014 ecosystem credits representing 6 vegetation types and 6 different species credits.

The six Biobank sites range in area from 2 to 54 hectares. The cost to generate each ecosystem credit (in perpetuity management costs only) varied from a low of \$4,159 (40 ha site at Silverdale) to \$31,708 (2 ha site at Rouse Hill) illustrating the significant influence that the area of the Biobank site, as well as condition and management requirements, has on the minimum pricing of credits and thus the affordability of credits in the market place.

The cost to purchase all of the ecosystem credits generated at these six sites (1,014) would be \$7.635M if the Biobank site owners only included the Biobank site establishment and in perpetuity management costs. However, if the owners choose to include land value or a proportion of land value in the credit sales price to allow for lost opportunity costs, the cost to purchase all credits would rise to between \$11.311M (25% of land value at the) and \$22.337M (100% of land value) (Table 15). The degree to which landowners may include land value in their credit prices is currently unknown and will depend on the degree to which landowners consider the registration of a Biobank site will affect their land value and competition in the market place (i.e. if there are several landowners who can all supply the same type of credit, it is likely that the base price to generate credits will vary across sites and the degree to which landowners need to or want to factor in land values may also vary).

The six offset sites did not generate the required number of credits or all of the correct types of credits had a formal Biobank assessment been undertaken. If the RTA was required to purchase the full 2,946 ecosystem credits required and they were available at the same prices as has been estimated for the 6 offset sites, the cheapest available credits would cost between \$12.273 M (in perpetuity management

costs only) and \$18.963M (with 100% land value) (Girl Guides site) (Table 16). However, the Girl Guides site does not generate the necessary types of credits. To purchase 2,946 credits from the Colebee site, which does generate the correct types of credits would cost between \$19,405M and \$72,801M (in perpetuity management costs only and 100% land value). The land values at Colebee are significantly higher than the Girl Guides site.

This study identified that the cost can be reduced slightly by a reduction in the price of ecosystem credits by including the value of species credits generated by each offset site (Tables 20, 21 and 22).

Whether the RTA would be required to purchase the full 2,946 credits of the correct type or not would depend on the conditions of approval. It is noted that the Minister for Planning has the ability to specify the number and types of credits, if any, in an approval (S75JA of the EP&A Act).

Whilst it has been demonstrated that the generation of credits at Biobank sites and their subsequent purchase and retirement to offset impacts at development sites is relatively simple and can be undertaken relatively quickly; the cost effectiveness of this depends on a number of factors including the size of the Biobank area, its condition, location and the degree to which land values are factored into credit prices. In summary, larger biobank sites in moderate condition, some distance from the impact site and growth areas are able to generate more credits at significantly lower costs and may have greater flexibility in the need to factor in all of the land value into credit prices. However, it is noted, that the ability to register Biobank sites in the greater Metropolitan area with this combination of criteria that can also supply the correct types of credits to offset impacts to Cumberland Plain vegetation types, is limited, but not absent. There are large areas of suitable land where development opportunities are constrained by the environmental values of the properties that would make costs effective Biobank sites.

In comparison, assessments undertaken by Eco Logical Australia for potential Biobank sites in rural areas of NSW ranging from 200-1,500 ha in area indicate that ecosystem credits, including full land value can be generated for between \$500 and \$2,500 per credit.

1 Introduction

The Department of Environment, Climate Change and Water (DECCW) has been undertaking an analysis of the cost to secure biodiversity offsets negotiated for the M7 Motorway Project with the Biobanking methodology as part of a case study to compare traditional negotiated offsets with using the Biobanking methodology. The study has been undertaken in two stages.

Stage one was the calculation of the number of Biodiversity credits required to offset the impacts of the M7 and the number of credits generated at the 6 offset sites negotiated to meet the requirements. This stage has been undertaken by the DECCW.

Stage two of the project is to undertake a comparative costs analysis between the traditional negotiated approach taken by the RTA and the purchase and retirement of biodiversity credits via the newly introduced Biobanking Scheme.

Eco Logical Australia Pty Ltd (ELA) has been commissioned by the DECCW to undertake Stage two of the study.

1.1 OBJECTIVE OF STAGE 2 OF THE STUDY

The objective of this study is to estimate the biodiversity credit price (ecosystem and species credits) for each of the six M7 offset sites using an estimate of the in perpetuity costs of management, the Biobank establishment costs and a range of opportunity costs. The resulting biodiversity credit prices would then be used to estimate the cost of securing the required number and types of credits to offset the impact of the M7. This cost will then be compared with the cost incurred by the RTA to meet its offset requirements for the M7 project.

1.2 BACKGROUND

In August 2001, the then National Parks and Wildlife Service (NPWS) granted concurrence in accordance with Section 79C of the EP&A Act to the M7 Motorway Project (the project).

The project resulted in the loss of approximately 72 ha of several vegetation types along the 39 km length of the project (NPWS 2001).

The conditions of concurrence required the RTA to negotiate a compensatory habitat package (offset package) with the Director-General of the NPWS. The criteria for this package are included at Appendix 1).

Since 2001, the RTA has investigated and assessed a range of options to meet these requirements, culminating in the purchase and subsequent transfer of 6 parcels of land totalling approximately 132 ha to the national parks estate during 2009. Table 1 provides a summary of the costs incurred by the RTA in meeting these requirements. The total cost of \$18.125M included ecological investigation, land purchase and transfer of funds for future management.

The main objective of this study is to compare the cost of meeting the concurrence conditions against the estimated cost had the RTA used the Biobanking methodology. It is noted that the Biobanking methodology was not available at the time the RTA commenced its investigations to secure offsets for the M7.

In order to make this comparison, the number of credits required to offset the impacts of the M7 and the number of credits generated at each of the six offset sites needs to be calculated. Once the number of

credits required is known and the cost to generate each credit has been determined, the cost to purchase and retire the calculated number and type of credits in accordance with the Biobanking Assessment methodology can be made.

Table 1 Cost to meet DECCW Offset requirements as specified in the concurrence decision for the M7

Offset Site	Rouse Hill	Horsley Park	Kemps Creek	Bents Basin	Girl Guides	Colebee	Total
Property Area (ha)	2.221	4.15	14.48	27.418	75.85	54.9	180.02
Property Purchase Price	\$2,000,000	\$2,330,000	\$2,430,000	\$1,960,000	\$2,600,000	\$7,690,000	\$19,010,000
Biobank Area (ha)	2.11	2.99	14.4	17.64	41	54.57	132.71
Biobank Market Value/Valuation	\$2,000,000	\$1,300,000	\$2,430,000	\$200,000	\$700,000	\$7,690,000	\$14,320,000
Stamp Duty/Legal fees (4%)	\$80,000	\$52,000	\$97,200	\$8,000	\$28,000	\$307,600	\$572,800
Market Value/ha	\$985,782	\$452,174	\$175,500	\$11,791	\$17,756	\$146,557	\$107,904
RTA Investigation Costs	\$88,000	\$88,000	\$88,000	\$88,000	\$88,000	\$88,000	\$528,000
RTA Consultants fees	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$150,000
Contribution to Cumberland Plain Recovery Program							\$100,000
RTA Mgt Cost prior to transfer	\$10,000	\$10,000	\$100,000	\$10,000	\$30,000	\$860,000	\$1,020,000
Mgt Costs Transferred to DECC#	\$21,100	\$29,900	\$144,000	\$176,400	\$410,000	\$545,700	\$1,327,100
Total	\$2,224,100	\$1,504,900	\$2,884,200	\$507,400	\$1,281,000	\$9,516,300	\$18,125,804
Total/ha	\$1,054,076	\$503,311	\$200,292	\$28,764	\$31,244	\$174,387	\$136,582

Based on the one-off transfer of \$10,000 for each hectare of land transferred to DECCW as specified in the conditions of concurrence.

1.3 ASSUMPTIONS AND LIMITATIONS OF THIS STUDY

There have been a number of assumptions made by the DECCW and ELA in undertaking this study that affect the robustness of the analysis and conclusions drawn.

1. The Motorway had already been constructed at the time the Biobank assessment for the impacts was undertaken by the DECCW. Accordingly the impact assessment could only use an estimate of the biometric condition of the vegetation based on descriptions in the original environmental impact assessment reports. The data in these reports was not collected by the same methods as a Biobank assessment.
2. Full Biobank assessments were not undertaken at each of the Biobank sites. Field data collection was limited by the time and resources available for the study and resulted in estimates, although robust, of condition against the biometric benchmarks in order to calculate the number of credits generated.
3. The selection of offsets sites by the RTA was determined in consultation with staff from the DECCW to meet the conditions of concurrence and ultimately included complimenting strategic park management objectives in western Sydney (Tim Hager & Ray Giddins pers.comm.), not as the most cost effective Biobank sites. The offset sites chosen by the RTA and accepted by the DECCW were generally very small (2-12 hectares in area), were already within or close to benchmark condition (and therefore do not generate the maximum number of credits possible per hectare) and being close to the impact site (as required by the approval conditions) had high underlying land values.
4. This history of site selection limits the effectiveness of comparing the Biobanking versus traditional approach of securing biodiversity offsets as it does not provide a true cost comparison. It is most likely that had the offset sites been chosen on the basis of being the most cost effective Biobank

sites (i.e. the properties would likely have been larger in size, in moderate condition with good resilience and therefore allowing greater improvements in biodiversity values) the number of credits generated would have been higher and the cost per credit lower.

5. It is difficult to determine to what extent land owners will factor land value into their credit prices as a lost opportunity cost without being the owner of the land and having an understanding of the particular circumstances as to why they have registered their property as a Biobank site. For example, whether they are using part of their property as a lifestyle change, a business investment or lack of other development opportunities. These circumstances all present the opportunity for there to be a range of possible degrees to which different Biobank site owners want to or need to factor in lost opportunity costs ranging from 0 to 100% or more of the market value of the land. It is expected that in a robust and competitive biodiversity credit market place, credits of the same type will be offered for sale with and without opportunity costs factored in. For the purpose of undertaking this study, a range of opportunity costs were included in the analysis as described in section 5.3.1.

2 Number of Credits required to offset biodiversity losses associated with the M7

Accredited Biobank Assessors from the Information and Assessment Section of the Environmental Protection and Regulation Division, DECCW, undertook a retrospective Biobank Assessment of the biodiversity impacts resulting from the M7 area. The data used was collated from the original species impact statement and concurrence report to estimate as close as possible the condition of the vegetation impacted along the route.

A copy of the Biobanking Credit reports (impacts were in both the Hawkesbury Nepean and Sydney Metro CMA Regions) for the impact assessments was provided by DECCW to ELA and are included in Appendix 2.

Table 2 provides a summary of these calculations and indicates the number of ecosystem credits required for each vegetation type impacted and the number of species credits for the number or area of each threatened species (fauna or flora respectively) impacted that requires species credits as determined by the credit calculator.

The credit reports in Appendix 2 show that the number of credits required per hectare of impact (range 17-63 across all vegetation zones, average 40) is relatively low and reflects that whilst the vegetation types being impacted are in Biometric moderate-good condition, many of the attributes, particularly hollow trees and logs on the ground were outside of benchmark condition.

A review of the credit profiles indicates that in almost every case, the credit profile only allows the impacts to each vegetation type to be offset in the same vegetation type and in either the Cumberland or Yengo Sub Regions of the Hawkesbury-Nepean CMA, i.e. the impacts resulting from the M7 project cannot be offset in other vegetation types or regions outside of the Cumberland Plain geographic area.

The only exception to this was for those impacts occurring in the Sydney Metro CMA Region where impacts to either the Forest Red Gum-Rough-barked Apple Grassy woodland or Grey Box-Forest Red Gum grassy woodland vegetation types could each be offset against each other and in 4 CMA sub regions (Cumberland, Burragorang, Wollemi and Yengo) although the occurrence of these vegetation types in these regions is very limited.

The Narrow-leaved Ironbark-Broad-leaved Ironbark- Grey Gum open forest could be offset against three vegetation types (Broad-leaved Ironbark – Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Turpentine - Grey Ironbark open forest on shale in the Lower Blue Mountains and itself) in a range of CMA sub regions (Cumberland, Burragorang, Wollemi, Yengo and Sydney Cataract), although these vegetation types do not necessarily occur in all of these regions.

Table 2 Summary of credits required to offset the biodiversity impacts of the M7.

Ecosystem Credits Western Sydney Vegetation Type	Revised Biometric Vegetation Type	Hawkes/Nepean CMA		Sydney Metro CMA		TOTAL		
		Area (ha)	Credits Req	Area (ha)	Credits Req	Area (ha)	Credits Req	Credits / ha
Cumberland River Flat Forest/Alluvial Woodland	Forest Red Gum - Rough-barked apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	7.4	314	8.1	344	15.5	658	42.48
Cumberland Shale Plains Woodland	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	34.1	1416	22.1	849	56.2	2,265	40.3
Shale Sandstone Transition Forest	Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest on the edges of the Cumberland Plain, Sydney Basin			0.5	23	0.5	23	46
TOTALS		41.5	1,730	30.7	1,216	72.2	2,946	40

Species Credits Threatened Flora		TOTALS						
		Inds	Credits Req'd	Inds	Credits Req'd	Inds	Credits Req	Credits / ind
<i>Acacia pubescens</i>				1	19	1	19	19
<i>Pimelea spicata</i>				55	2,500	55	2,500	45
<i>Dillwynia tenuifolia</i>		342	6,218			342	6,218	18
<i>Grevillea juniperina subsp juniperina</i>		1,759	35,180			1,759	35,180	20
TOTALS	TOTALS						43,917	

3 Number of Credits generated at approved M7 offset sites

Accredited Biobank Assessors from the Information and Assessment Section of the Environmental Protection and Regulation Division, DECCW, undertook Biobank Assessments for each of the 6 offset areas in accordance with the BioBanking assessment methodology with the exception that no biometric condition plots were undertaken. Instead, DECCW officers estimated the biometric condition scores for each vegetation zone from observations of the condition of each habitat attribute against the respective benchmarks.

This basically involved confirming the vegetation types found at each site and stratifying into vegetation condition zones, estimating the biometric condition of each zone from a visual assessment of the key attributes (species richness, hollow bearing trees, logs on ground, weed cover) and in consultation with Eco Logical Australia undertaking revised credit assessments if any additional management actions (such as replanting, introduction of logs) were recommended to determine the number of credits generated.

A copy of the Biobanking Credit reports for the Biobank site assessments were provided by DECCW to ELA and are included in Appendix 3. Tables 3 and 4 provide a summary of the number and types of credits generated at each Biobank site. A quick analysis of Tables 3 and 4 indicates that the offset sites do not generate the required number or types of credits required to meet the improve or maintain test of the Biobanking Scheme (2,946 credits required, 1,014 credits generated) and that many of the credits generated do not meet the credit profiles (refer to Appendix 2). In fact, only 648 of the ecosystem credits generated will meet the trading rules of the Biobanking scheme.

It is also noted that the number of credits generated per hectare at each Biobank site is relatively low (range 6.6 to 8.1) which reflects that the majority of the sites are within or close to benchmark condition and thus have limited capacity to "improve" biodiversity values.

If Biobank sites are outside benchmark condition, the number of credits generated per hectare can be as high as 10-12 credits per hectare (numerous Biobank Site Assessments undertaken by ELA 2008-2009 and John Seidel, DECCW, pers. comm.).

The relatively low number of credit generated at the six offset sites reflects the criteria that the RTA were required to meet in order to meet the concurrence conditions relating to the offset package i.e. the offset sites were to meet the definition of "core habitat" in the DECCW conservation significance assessment for the Cumberland Plain. Sites in benchmark condition are not the primary target of Biobank sites in the Biobank scheme as the scheme has been established on an "improve or maintain" principle, that is sites that have the capacity to improve in condition and hence biodiversity value over time are able to generate more credits than sites that are in low condition or good condition.

Had the RTA selected sites to act as the most cost effective and feasible Biobank sites, it is likely that a greater number of credits per hectare would have been generated.

Table 3 Number of Ecosystem Credits generated at each offset site

Ecosystem Credits Generated	Rouse Hill	Horsley Park	Kemps Creek	Bents Basin	Girl Guides	Colebee	Total Credits Generated
Biobank Area (ha)	2.11	2.99	12.85	17.84	41	54.57	131.36
Forest Red Gum - Rough-barked apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	3	6					9
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	13	16	102			232	363
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest on the edges of the Cumberland Plain, Sydney Basin				83	193		276
Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin						208	208
Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin					123		123
Smoothed-barked Apple - Red Bloodwood - Sydney peppermint heathy open forest in sandstone gullies of western Sydney, Sydney Basin				35			35
Total No. of credits generated at Biobank site	16	22	102	118	316	440	1,014
No. of credits generated per hectare	7.6	7.4	7.9	6.6	7.7	8.1	7.7

Table 4 No of Species Credits generated at each offset Site

Species Credits Generated	Rouse Hill	Horsley Park	Kemps Creek	Bents Basin	Girl Guides	Colebee	Total Credits Generated
<i>Acacia pubescens</i>			60				60
<i>Pimelia spicata</i>		450					450
<i>Dillwynia tenuifolia</i>						15,000	15,000
<i>Grevillea juniperina</i>						30,000	30,000
<i>Putenaea parviflora</i>						15,000	15,000
Square-tailed Kite (ha)				102	180		282
Total No. of Species Credits generated at Biobank site(s)	0	450	60	102	180	60,000	60,792

4 Description of offset sites & basis of management costs

4.1 COLEBEE

4.1.1 Site Description

The Colebee offset site (Figure 1) comprises 54.57 ha's of bushland at Marsden Park within the Blacktown Local Government Area (LGA), located north east of the junction between Richmond Road and the M7 motorway. The offset makes up the majority of Lot 41 DP 1100854.

The central part of the Colebee site was formerly used for chicken farming involving significant infrastructure and land disturbance. The site is bordered by recent suburban development to the east (Medallist housing estate and Golf Course - not shown on aerial photography used within this project) and rural lands to the north and west. Part of the southern border of the site is formed by the RTA road easement with the M7 and a proposed link to the M2.

Degraded areas due to chicken farming and dumping within the Colebee site required decontamination and other rehabilitation activities (funded by the RTA as part of the land transfer costs). The site has also had ongoing visitation by motorbike and BMX users and an informal track network has been created, including berm construction and other minor earthworks.

The vegetation of the offset site was mapped by DECCW Metropolitan Branch as part of the Biobank Assessment for this project (Table 5).

Table 5: Vegetation Zones and Extent within the Colebee Offset Site

Biobanking Vegetation Zone	Biometric Condition	Area (hectares)
Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin	Low	3.45
Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin	Moderate-Good	22.87
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Low	3.99
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Moderate-Good	24.26
Total		54.57

The vegetation within the site ranged in disturbance with some areas experiencing negligible disturbance from weed invasion, track use and soil disturbance, while other areas were significantly affected by these disturbance factors (e.g. areas previously requiring decontamination).

While major disturbance was concentrated in areas assessed as being in low condition, there were also areas within the good to moderate condition patches with significant tracks and sporadic weed infestations. Weeds included African Love Grass (*Eragrostis curvula*), Bridal Creeper (*Asparagus asparagoides*) and Castor Oil Plant (*Ricinus communis*).

Throughout large parts of the site *Bursaria (Bursaria spinosa)* frequently formed a thick cover within the midstorey, suggesting relatively long periods since burning. Thickets of the vulnerable plant species *Dillwynia tenuifolia* were also associated with disturbed areas.

The threatened plants *Pultenaea parviflora*, *Grevillea juniperina* subsp. *juniperina* and *Dillwynia tenuifolia* are present at the site and have been attributed species credits under the biobanking tool.

4.1.2 Key Management Issues

The following key management issues were assessed as the main management required to meet the incremental improvements in biodiversity values at the site consistent with the standard Biobanking management actions:

- Fencing for restriction of inappropriate access (particularly motorbikes) and rubbish dumping leading to site degradation;
- Management trail alteration and removal of unnecessary trails and berms;
- Rehabilitation and rubbish removal;
- Weed control;
- Assisted revegetation in expansive areas with weed incursion or previous soil disturbance;
- Implementation of ecological burns for maintenance of biodiversity values;
- Feral and pest animal control.

4.1.3 Fencing

The boundary of the Colebee site is currently fenced to different standards. Two types of fencing exist: a 6 ft chain-mesh fencing around the southern and eastern boundaries of the site that has recently been completed by the RTA as part of the Medallist development, and stock proof fencing along the western and northern boundaries.

The current fencing is seen as being appropriate for the site in regard to restricting inappropriate access. Maintenance of the current fencing would be required for a biobanking site and this was costed for the site. While NPWS might adopt use of a high tensile wire fence in order to exclude motorbikes and similar intrusions to the site, retention of the current fence was deemed the best option from a private landholder perspective given the expansion of suburban development near the site (acting to discourage vandalism of fences). The risk to fencing security has been incorporated into costs by assuming more frequent replacement costs than at other sites (1 in 10 years as opposed to 1 in 20).

4.1.4 Tracks and Trails

There is a need to maintain some of the existing trails within the site to allow for management of the site (e.g. conducting ecological burns and feral animal management programs). Other trails would be removed i.e. ripped to enable decompacting of the soils. These activities have been included in costings.

4.1.5 Rehabilitation and Weed Management

Extensive decontamination of the site (funded by the RTA as part of transfer costs - \$750,000), was incorporated into establishment costs for Colebee as a Biobank site. There was limited scope to omit this cost and exclude the area from the biobanking agreement, potentially reducing costs significantly due to the location of the contaminated area in the centre of the site. However, to maintain consistency with other sites, the area and associated management costs were included in the assessment.

Areas with large-scale soil disturbance and prolific weeds, totalling approximately 1.5 hectares were costed for rehabilitation comprising weed removal and planting. Elsewhere, throughout the site, weed management would be conducted by spot spraying and other methods appropriate to the target species on a routine basis.

4.1.6 Ecological Burns

Burns have been catered for by assuming compartmentalization of the site into 6 areas to achieve a 15 to 20 year burn frequency. As with other sites, a donation to the Rural Fire Service has been assumed

for costing burns, and this considerably reduces comparative costs incurred by NSW NPWS for conducting similar burns.

4.1.7 Feral Animal Management

The offset area is not adjacent to any other conservation reserves and thus feral animal control is considered a necessary Biobank management action. The target species are foxes and rabbits.

It has been assumed that management of other feral animals required by standard Biobank agreements (feral pigs, goats and deer) is not relevant to the site as they are unlikely to be an issue given the location of the offset. Minimal allowances have been provided to remove any feral goats, pigs or deer that may enter the Biobank site, most likely as escaped farmed animals. Cost estimates were based on approximations by NPWS Staff.

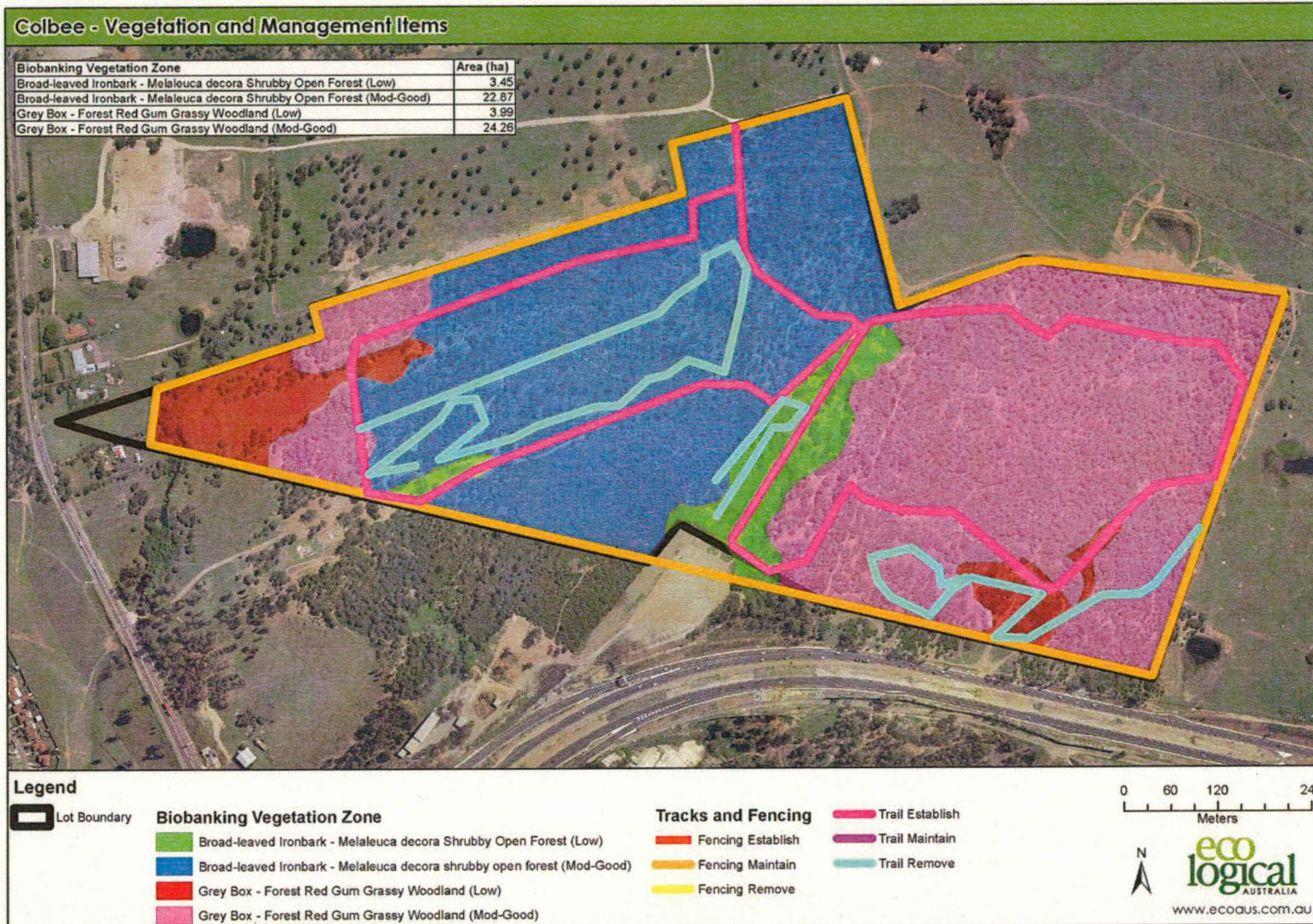


Figure 1: Colebee Site and Selected Management Actions

4.2 KEMPS CREEK

4.2.1 Site Description

The Kemps Creek offset site (Figure 2) comprises 14.4 ha's of bushland at Kemps Creek within the Liverpool Local Government Area, located south of Elizabeth Drive near its junction with Mamre Road. The offset comprises Lots 13 and 14 - DP 1065416.

An electricity easement and dirt lane access track runs through the centre of the Kemps Creek site between the two lots. The site is bordered by the Sydney International Shooting Centre to the east and disturbed lands to the west and north. The southern border of the site is adjacent to bushland managed by Integral Energy, and the Kemps Creek nature reserve (south-western corner).

The site is predominantly in good condition, with a small area within the north east of the site that had previously been disturbed due to dumping of material (including asbestos) and clearing.

The vegetation of the offset site was mapped by DECCW Metropolitan Branch as part of the Biobank Assessment for this project (Table 6).

Table 6: Vegetation Zones and Extent within the Kemps Creek Offset Site

Biobanking Vegetation Zone	Biometric Condition	Area (hectares)
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Low	0.39
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Moderate-Good	14.07
Total		14.46

The vegetation within the site is characterized by very low levels of weed invasion and other disturbance factors. There are, however, few large old-growth trees and associated habitat.

The threatened plant *Acacia pubescens* was previously recorded at the site and attributed species credits under the biobanking tool.

4.2.2 Key Management Issues

The following key management issues were assessed as the main management required to meet the incremental improvements in biodiversity values at the site consistent with the standard Biobanking management actions:

- Fencing for restriction of inappropriate access (e.g. motorbikes) and rubbish dumping leading to site degradation;
- Rehabilitation and rubbish removal;
- Weed control;
- Implementation of ecological burns for maintenance of biodiversity values;
- Feral and pest animal control.

4.2.3 Fencing

The Kemps Creek site is currently completely fenced with 6ft chain mesh fencing. The current fencing is seen as being appropriate for the site in regard to restricting inappropriate access. Maintenance of the current fencing would be required for a biobanking site and this was costed for the site. While NPWS might adopt use of a high tensile wire fence in order to exclude motorbikes and similar intrusions to the site, retention of the current fence was deemed the best option from a private landholder perspective since the fencing is already in place.

4.2.4 Tracks and Trails

The current easement through the site is maintained by Integral energy. Current management of this easement would remain Integral's responsibility and therefore no cost has been dedicated to trail maintenance.

4.2.5 Rehabilitation and Weed Management

Decontamination of a small area within the site (funded by the RTA as part of transfer costs - \$100,000), was incorporated into establishment costs for Kemps Creek as a Biobank site.

The site has very low weed disturbance, but costs have been incorporated into management of the site to keep weeds suppressed by spot spraying and other similar activities as appropriate for specific weed species.

4.2.6 Ecological Burns

Burns have been catered for by assuming compartmentalization of the site into 4 areas to achieve a 15 to 20 year burn frequency. As with other sites, a donation to the Rural Fire Service has been assumed for costing burns, and this considerably reduces comparative costs incurred by NSW NPWS for conducting similar burns.

4.2.7 Feral Animal Management

The offset area is adjacent to the Kemps Creek Nature Reserve and thus feral animal control would occur in concert with management of ferals within the Reserve. Participation within existing programs has allowed for cost savings due to economies of scale associated with managing one large area rather than small areas separately.

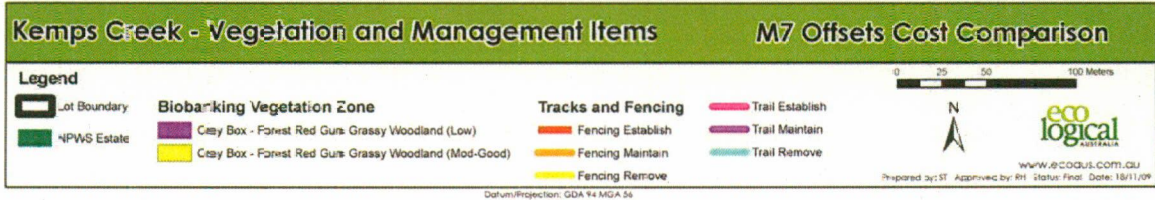


Figure 2: Kemps Creek Site and Selected Management Actions

4.3 GIRL GUIDIES

4.3.1 Site Description

The Girl Guides offset site (Figure 3) comprises 41 ha's of bushland at Silverdale within the Bankstown and Wollondilly Local Government Areas, located east of Taylors Road near its junction with Barrington Road. The offset encompasses parts of Lot 831 - DP 810005 and Lot 22 - DP 594195.

The site was formerly used as a girl guides camping area, and its south-eastern portion has previously been cleared. The site is bordered by a combination of rural development, bushland (including the Bents Basin offset site) and the Bents Basin State Conservation Area.

Revegetation works have taken place within parts of the cleared portion of the site and removal of dilapidated structures and dumped materials in other (minor) areas has also been undertaken or is forecast to occur in the near-future. These activities were incorporated into land transfer costs by the RTA.

The vegetation of the offset site was mapped by DECCW Metropolitan Branch as part of the Biobank Assessment for this project (Table 7).

Table 7: Vegetation Zones and Extent within the Girl Guides Offset Site

Biobanking Vegetation Zone	Biometric Condition	Area (hectares)
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest on the edges of the Cumberland Plain, Sydney Basin	Low	0.72
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest on the edges of the Cumberland Plain, Sydney Basin	Moderate-Good	23.28
Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin	Low	0.50
Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin	Moderate-Good	16.57
Total		41.07

With the exception of the previously cleared area, vegetation within most of the site has generally experienced low disturbance with sporadic weed invasion (mostly European Olive) reaching moderate levels within some parts of the site. The formerly cleared area, while significantly disturbed due to past clearing, has a high proportion of native ground cover. There are some incursions of introduced grasses (e.g. Kikuyu and African Love Grass) into the previously cleared areas and other margins.

While major disturbance was concentrated in areas assessed as being in low condition, there were also areas within the good to moderate condition patches with significant tracks and sporadic weed infestations.

The threatened kite *Lophoictinia isura* has been recorded at the site and attributed species credits under the biobanking tool.

4.3.2 Key Management Issues

The following key management issues were assessed as the main management items required to meet the incremental improvements in biodiversity values at the site consistent with the standard Biobanking management actions:

- Fencing for restriction of inappropriate access (particularly motorbikes) and rubbish dumping leading to site degradation;
- Management trail alteration and;
- Rehabilitation and rubbish removal;
- Weed control;

-
- Implementation of ecological burns for maintenance of biodiversity values;
 - Feral and pest animal control.

4.3.3 Fencing

The Girl Guides site is currently fenced with stock-proof fencing to varying degrees. Some fencing will need to be established along the western border of the site and stock-proof fencing has been selected, due to projected future land use adjacent to the site being private properties (therefore relatively low risk of vandalism). Some of the internal fencing within the site would be removed to facilitate better movement of fauna around the site.

4.3.4 Tracks and Trails

There is a need to maintain some of the existing trails within the site to allow for management of the site (e.g. conducting ecological burns and feral animal management programs). Other trails would be allowed to naturally regenerate. Trails within the site are located on relatively flat ground and are in good condition – these factors have been considered in cost projections.

4.3.5 Rehabilitation and Weed Management

Decontamination and clean up of the site (funded by the RTA as part of transfer costs - \$30,000), was incorporated into establishment costs for Gulguer as a Biobank site. Revegetation works carried out within cleared areas of the site included plantings of non-endemic tree species (e.g. *Grevillea robusta* – Silky Oak) which are a potential threat to biodiversity. Removal of these trees has been included in establishment costs.

The site has generally low weed disturbance, but costs have been incorporated into management of the site to keep weeds suppressed by spot spraying and other similar activities as appropriate for specific weed species. Areas with moderate weed invasion will be targeted for intensive weed control activities over the first three years of management activities.

4.3.6 Ecological Burns

Burns have been catered for by assuming compartmentalization of the site into 7 areas to achieve a 15 to 20 year burn frequency. As with other sites, a donation to the Rural Fire Service has been assumed for costing burns, and this considerably reduces comparative costs incurred by NSW NPWS for conducting similar burns.

4.3.7 Feral Animal Management

The offset area is adjacent to the Bents Basin State Conservation Area and thus feral animal control would occur in concert with management of ferals within the Reserve. Participation within existing programs has allowed for cost savings due to economies of scale associated with managing one large area rather than small areas separately. Goat, Deer and Fox management has been budgeted for as these were highlighted as the primary concerns.

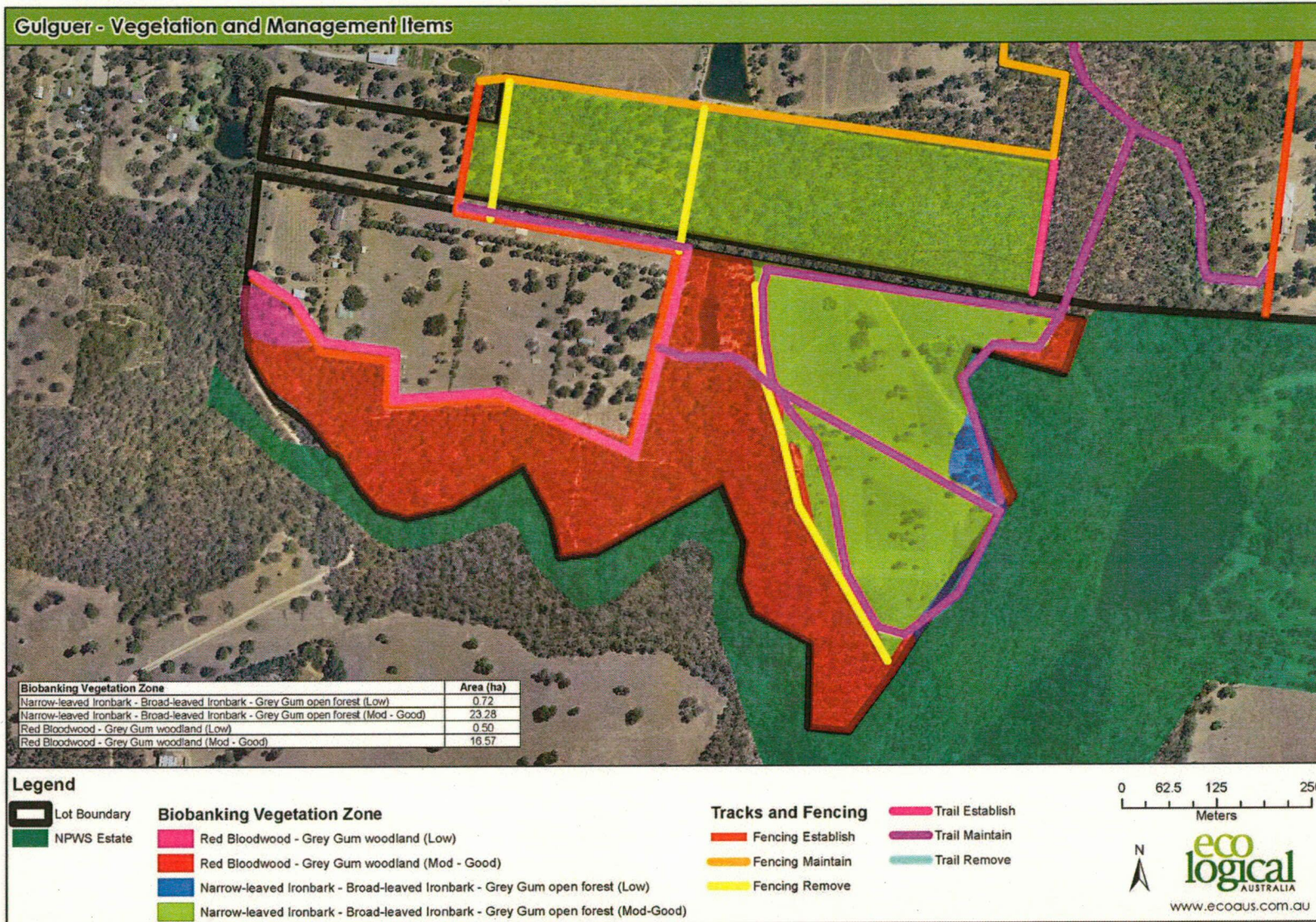


Figure 3: Girl Guides Site and Selected Management Actions

4.4 BENTS BASIN

4.4.1 Site Description

The Bents Basin offset site (Figure 4) comprises 17.64 ha's of bushland at Wallacia within the Wollondilly Local Government Area, located near the southern extremity of Bents Basin Road. The offset comprises the majority of Lot 1, DP 530284.

The site is relatively steep, declining from gently sloping tablelands in the western portion of the site to sandstone gully within the east of the site, derived from the Nepean River further east. The site is bordered by rural residential land to the east and bushland to the west and south including the Gulguer offset site and the Bents Basin State Conservation Area.

The eastern margin of the site was historically used as a racing track and there is a remnant narrow bitumen road through a small portion of the site. The western portion of the site and most of the steeper sections are relatively undisturbed.

The vegetation of the offset site was mapped by DECCW Metropolitan Branch as part of the Biobank Assessment for this project (Table 8).

Table 8: Vegetation Zones and Extent within the Bents Basin Offset Site

Biobanking Vegetation Zone	Biometric Condition	Area (hectares)
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest on the edges of the Cumberland Plain, Sydney Basin	Moderate-Good	12.94
Smoothed-barked Apple - Red Bloodwood - Sydney peppermint heathy open forest in sandstone gullies of western Sydney, Sydney Basin	Moderate-Good	4.7
Total		17.64

Most of the site has generally experienced low disturbance with sporadic weed invasion (mostly European Olive) reaching moderate to high levels along the eastern boundary of the site associated with the former race track area and boundary with cleared lands. There is a small area of disturbed land in the south-east of the site, where dumping had occurred, which is now moderately weed infested.

4.4.2 Key Management Issues

The following key management issues were assessed as the main management items required to meet the incremental improvements in biodiversity values at the site consistent with the standard Biobanking management actions:

- Fencing for restriction of inappropriate access (particularly motorbikes) and rubbish dumping leading to site degradation;
- Management trail alteration and;
- Rehabilitation and rubbish removal;
- Weed control;
- Implementation of ecological burns for maintenance of biodiversity values;
- Feral and pest animal control.

For the purposes of management cost calculations it was assumed for the Bents Basin and Gulguer sites that adjacency to one another was akin to adjacency to State Conservation Area lands, since this is the prevailing situation. Hence, a maintenance track between the two has been costed into the Bents Basin Site for access and to manage burns etc. (as will occur under management by NPWS). Conversely, no fence is required between the two sites.

4.4.3 Fencing

The Bents Basin site is currently fenced with stock-proof fencing along its boundary with privately owned rural lands to the north and west. Fencing will need to be established along the eastern border of the site and chain mesh fencing has been selected, due to the interface with lands that are readily accessible by the public, and since chain mesh fencing will be used in future under management by NPWS.

4.4.4 Tracks and Trails

There is a need to create a portion of new dirt track, and reconstruct some of the existing bitumen trails within the site to allow for management (e.g. conducting ecological burns and feral animal management programs). These activities would require importation of fill and this has been included in costings.

4.4.5 Rehabilitation and Weed Management

Removal of fill and rubbish from the south western corner of the site (funded by the RTA as part of transfer costs - \$10,000), was incorporated into establishment costs for Bents Basin as a Biobank site.

4.4.6 Ecological Burns

Burns have been catered for by assuming compartmentalization of the site into 4 areas to achieve a 15 to 20 year burn frequency. As with other sites, a donation to the Rural Fire Service has been assumed for costing burns, and this considerably reduces comparative costs incurred by NSW NPWS for conducting similar burns.

4.4.7 Feral Animal Management

The offset area is adjacent to the Bents Basin State Conservation Area and thus feral animal control would occur in concert with management of ferals within the Reserve. Participation within existing programs has allowed for cost savings due to economies of scale associated with managing one large area rather than small areas separately. Goat, Deer, Pig and Fox management has been budgeted for as these were highlighted as the primary concerns.

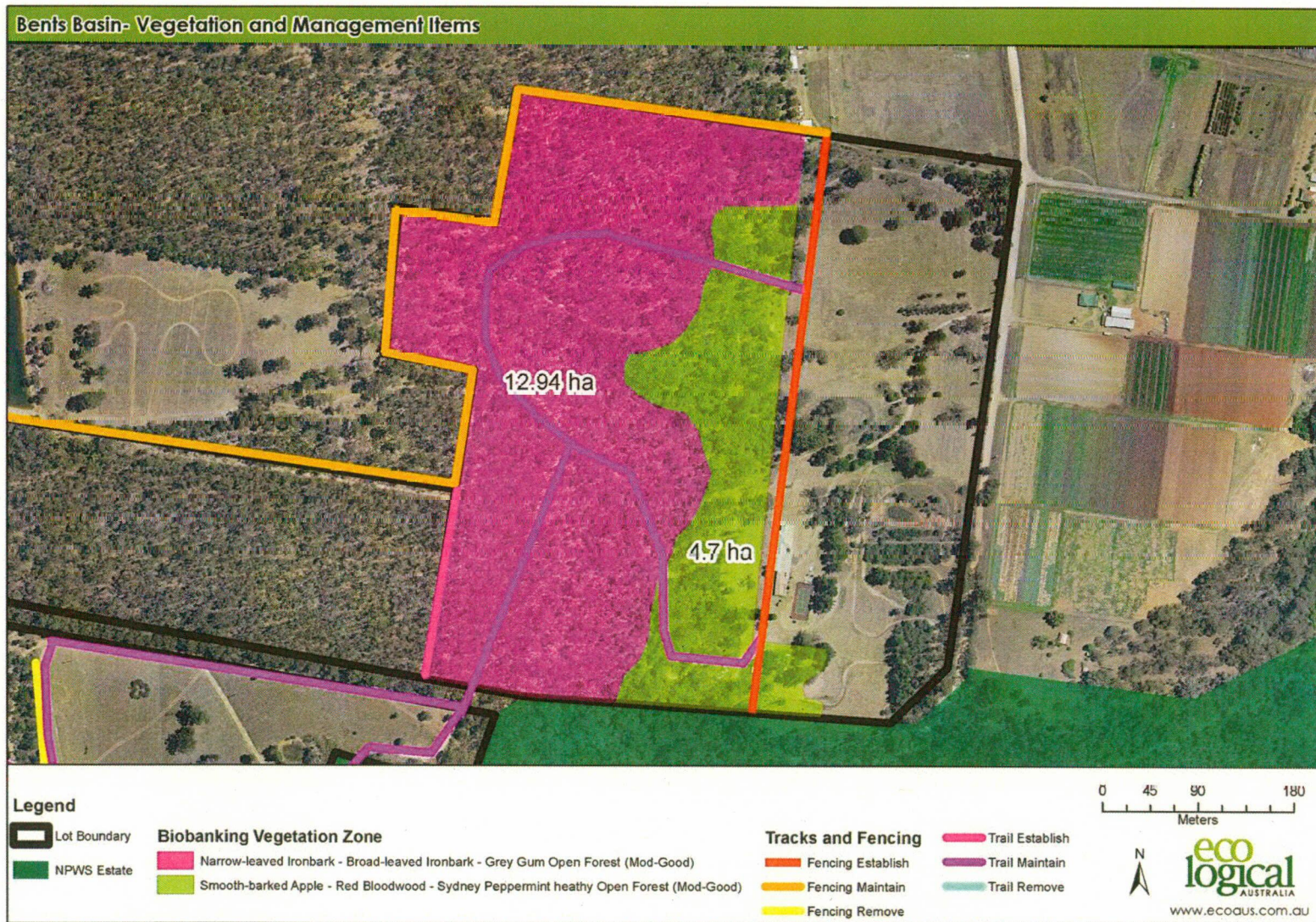


Figure 4: Bents Basin Site and Selected Management Actions

4.5 HORSLEY

4.5.1 Site Description

The Horsley offset site (Figure 5) comprises 3 ha's of bushland at Horsley Park within the Fairfield Local Government Area, set back (south) from the Horsley Drive near its intersection with the M7 Freeway. The offset comprises the majority of Lot 91B, DP 17288.

The remainder of the lot is occupied by a rural residence along the northern boundary and its associated access to The Horsley Drive. The site is bordered by rural lands to the east, and the Western Sydney Recreation Park to the south and west. The site is relatively flat and encompasses a small section of eastern creek within its south western portion.

The vegetation of the offset site was mapped by DECCW Metropolitan Branch as part of the Biobank Assessment for this project (Table 9).

Table 9: Vegetation Zones and Extent within the Horsley Offset Site

Biobanking Vegetation Zone	Biometric Condition	Area (hectares)
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Moderate-Good	2.16
Forest Red Gum - Rough-barked apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	Moderate-Good	0.83
Total		2.99

The site is low to moderately disturbed with sporadic weed invasion throughout most of the site (European Olive, African Love Grass and Bridal Creeper) and thicker infestations in small patches. There are small areas within the site where fill material has been dumped.

4.5.2 Key Management Issues

The following key management issues were assessed as the main management items required to meet the incremental improvements in biodiversity values at the site consistent with the standard Biobanking management actions:

- Fencing for restriction of inappropriate access (particularly motorbikes) and rubbish dumping leading to site degradation;
- Management trail alteration and;
- Rehabilitation and rubbish removal;
- Weed control;
- Implementation of ecological burns for maintenance of biodiversity values;
- Feral and pest animal control.

For the purposes of assessing costs for the Horsley site, it has been assumed that the entire lot (of which the offset site is the dominant feature) would be owned, occupied and managed by the current resident within the lot.

4.5.3 Fencing

The Horsley site requires establishment of stock-proof fencing along its eastern boundary with privately owned rural lands. 6ft chain wire fencing exists along its northern (internal boundary with residence within the same lot) and western boundary with the equestrian centre. The current fencing is deemed appropriate and would be maintained.

4.5.4 Tracks and Trails

No tracks are necessary for management of the site. There is currently a mowed area west of existing internal fencing along the northern boundary and this would be maintained during bush regeneration activities to allow for egress.

4.5.5 Rehabilitation and Weed Management

Removal of fill and rubbish from the site (funded by the RTA as part of transfer costs - \$10,000), was incorporated into establishment costs for Horsley as a Biobank site.

The site has moderate weed disturbance, and costs have been incorporated into management of the site to keep weeds suppressed by spot spraying and other similar activities as appropriate for specific weed species. Areas with moderate - high weed invasion will be targeted for intensive weed control activities over the first three years of management activities.

4.5.6 Ecological Burns

Burns have been catered for by assuming compartmentalization of the site into 3 areas to achieve a 15 to 20 year burn frequency. As with other sites, a donation to the Rural Fire Service has been assumed for costing burns, and this considerably reduces comparative costs incurred by NSW NPWS for conducting similar burns.

4.5.7 Feral Animal Management

The offset area constitutes a small area of vegetation which is surrounded by large expanses of bushland with varying levels of feral management. Therefore feral management has been catered to address requirements of biobanking agreements and focuses on fox and rabbit suppression within the site.

It has been assumed that management of other feral animals required by standard Biobank agreements (feral pigs, goats and deer) is not relevant to the site as they are unlikely to be an issue given the location of the offset. Minimal allowances have been provided to remove any feral goats, pigs or deer that may enter the Biobank site, most likely as escaped farmed animals. Cost estimates were based on approximations by NPWS Staff.



Horsley - Vegetation and Management Items **M7 Offsets Cost Comparison**

Legend			
Lot Boundary	Biobanking Vegetation Zone	Tracks and Fencing	Trail Establish
NPWS Estate	Forest Red Gum - Rough Barked Apple Grassy Woodland (Mod-Good)	Fencing Establish	Trail Maintain
	Grey Box - Forest Red Gum Grassy Woodland (Mod-Good)	Fencing Maintain	Trail Remove
		Fencing Remove	

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Prepared by: SJ Approved by: RH Status: Final Date: 18/11/09

Datum/Projection: GDA 94 MGA 56

Figure 5: Horsley Site and Selected Management Actions

4.6 ROUSE HILL

4.6.1 Site Description

The Rouse Hill offset site (Figure 6) comprises 2.1 ha's of bushland at Rouse Hill within the Blacktown Local Government Area, south of Windsor Road near its intersection with Aberdour Ave. The offset comprises Lot 189, DP 201260.

The site is bordered by rural lands to the south and west, which are moderately to highly disturbed; the Rouse Hill Recreation Park to the north, and suburban development across Windsor Road to the east. The site is relatively flat and encompasses a small section of Second Ponds Creek within its north western corner.

The vegetation of the offset site was mapped by DECCW Metropolitan Branch as part of the Biobank Assessment for this project (Table 10).

Table 10: Vegetation Zones and Extent within the Rouse Hill Offset Site

Biobanking Vegetation Zone	Biometric Condition	Area (hectares)
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Moderate-Good	1.76
Forest Red Gum - Rough-barked apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	Moderate-Good	0.35
Total		2.11

The site is moderately disturbed with weed invasion present throughout most of the site (European Olive, Moth Vine, Small and Large-leaved Privet and Bridal Creeper) and thicker infestations in small patches and along the riparian area (particularly Trads).

4.6.2 Key Management Issues

The following key management issues were assessed as the main management items required to meet the incremental improvements in biodiversity values at the site consistent with the standard Biobanking management actions:

- Fencing for restriction of inappropriate access (particularly motorbikes) and rubbish dumping leading to site degradation;
- Management trail alteration and;
- Rehabilitation and rubbish removal;
- Weed control;
- Implementation of ecological burns for maintenance of biodiversity values;
- Feral and pest animal control.

4.6.3 Fencing

The Rouse Hill site requires establishment of 6ft chain mesh fencing along its eastern boundary with Windsor Road. Chain mesh fencing has been selected to keep out unwanted access and is deemed appropriate due to its frontage with Windsor Road, to maintain consistency with the rest of the site, and its lower cost compared with high tensile fencing.

Current fencing consists of a mixture of stock proof and 6ft chain wire fencing along the southern and western boundaries with rural residences and associated paddocks. The current fencing is deemed appropriate (with stock fencing present in the vicinity of the adjacent residence and chain mesh fencing bordering paddocks containing stock and pigs).

4.6.4 Tracks and Trails

No tracks are necessary for management of the site.

4.6.5 Rehabilitation and Weed Management

Removal of fill and rubbish from the site (funded by the RTA as part of transfer costs - \$10,000), was incorporated into establishment costs for Horsley as a Biobank site.

The site has moderate weed disturbance, and costs have been incorporated into management of the site to keep weeds suppressed by spot spraying and other similar activities as appropriate for specific weed species. Areas with moderate - high weed invasion will be targeted for intensive weed control activities in the first year of management activities.

4.6.6 Ecological Burns

Burns have been catered for by assuming compartmentalization of the site into 2 areas to achieve a 15 to 20 year burn frequency. As with other sites, a donation to the Rural Fire Service has been assumed for costing burns, and this considerably reduces comparative costs incurred by NSW NPWS for conducting similar burns.

4.6.7 Feral Animal Management

The offset area constitutes a small area of vegetation which is surrounded by large expanses of bushland with varying levels of feral management. Therefore feral management has been catered to address requirements of biobanking agreements and focuses on fox and rabbit suppression within the site.

It has been assumed that management of other feral animals required by standard Biobank agreements (feral pigs, goats and deer) is not relevant to the site as they are unlikely to be an issue given the location of the offset. Minimal allowances have been provided to remove any feral goats, pigs or deer that may enter the Biobank site, most likely as escaped farmed animals. Cost estimates were based on approximations by NPWS Staff.

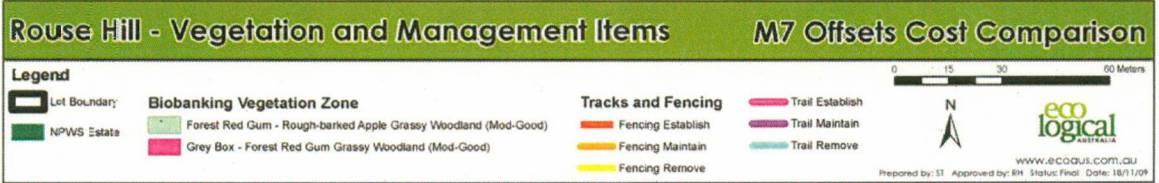


Figure 6: Rouse Hill Site and Selected Management Actions

5 Estimating the In Perpetuity Cost of management and potential Credit sales price

A brief (one day) site inspection was made of each offset site in the company of the Parks and Wildlife Group (PWG) Area Managers familiar with and responsible for the long term management of the area to determine the annual and in perpetuity costs of management.

At each site, the management actions, frequency, intensity and duration required to meet the standard Biobank management actions and any additional management actions determined by the credit calculator were assessed and estimates of the time and equipment/materials requirements made.

To assist in determining the management requirements, large scale, high resolution maps of each offset site were prepared to provide information on the surrounding land use, length of Biobank site perimeter (and what proportion was adjacent to a complimentary management areas such as another Biobank site or national park reserve), the length of tracks and trails and the area of each vegetation condition class.

The 'standard' and 'additional' management actions that may be required at a Biobank site for the creation of ecosystem and/or species credits is outlined in Section 2.6 of the Biobanking Assessment Methodology (DECC 2008). Standard actions are those that apply to the generation of ecosystem credits and include:

- Management of grazing for conservation;
- Weed control;
- Management of fire for conservation;
- Management of human disturbance;
- Retention of regrowth and remnant native vegetation;
- Replanting or supplementary planting where natural regeneration will not be sufficient;
- Retention of dead timber;
- Erosion control; and
- Retention of rocks.

'Additional' actions are those that apply to the management of threatened species and their habitats, for either the creation of ecosystem credits (where threatened species are predicted on site) or for species credits. Additional actions include:

- Control of feral and/or overabundant native herbivores;
- Vertebrate pest management – Feral Pigs; and
- Vertebrate pest management – Foxes and/or miscellaneous species;

The underlying principle used for these assessments was that the sites would be managed in accordance with the standard management actions for a Biobank site, where appropriate, and be managed in a similar manner to the adjacent National Park reserve except where that management was for recreation purposes.

While the above principle was generally adhered to, there were several differences in how the management of the adjacent national park was undertaken compared to a Biobank site. These included the likely presence of land managers living on-site for the Biobank sites versus an absentee park manager and the application of generic management requirements under a Biobanking Agreement (regardless of the size and context of the site) unless it was clearly unreasonable to do so.

For example, fox and other vertebrate feral animal control programs (e.g. feral pigs, goats and deer) are required under a standard Biobanking Agreement regardless of the size or context of a site. This requirement adds significantly to the in perpetuity costs of management even though the efficacy of the feral animal control program is likely to be minimal without a landscape approach to the management of feral animals. Where the offset sites are adjacent to national parks managed reserves, the costs of undertaking feral animal control programs have been incorporated into an expanded National Parks program. However, fox control is no longer a standard vertebrate pest control activity in NPWS Reserves unless there is an identified priority species that requires protection from predation by foxes. Thus for many of the offset sites, whilst they are adjacent to national parks managed reserves, the adjacent reserves are not being undertaking fox control. Standard fox control measures have therefore only been included where the offset sites are considered significantly large enough to benefit from a fox control program (e.g. Colebee, Girl Guides and Bents Basin). Other examples of differing costs calculations between management of private Biobank sites versus National Parks are included in the summary of cost calculations below.

Once agreement was reached between ELA and the PWG representative, ELA contacted a range of commercial contractors to determine the commercial costs of implementing relevant management actions such as fence and trail establishment and maintenance, weed control, feral animal control and planning and implementing ecological burns. Where appropriate, ELA also used its own experience in determining management costs such as bush regeneration and bringing logs onto a site developed through a 5 year program of managing Cumberland Plain Woodland at a 100ha site in Camden LGA.

Based on these site inspections and the management (Credit Cost Part A) and other costs (Credit Cost Part B), the in perpetuity management costs for each potential Biobank site were calculated using the Credit Pricing spreadsheets provided by DECCW. A copy of the completed Total Fund Deposit (or in perpetuity management costs) for each site is included at Appendix 4.

Details regarding how these costs were estimated and the assumptions made are provided in Sections 5.1, 5.2 and 5.3.

5.1 IN PERPETUITY MANAGEMENT COSTS (CREDIT COST PART A)

Management actions have been separated into establishment costs (one off costs that would occur only in the initial year - or the first few years) and in perpetuity maintenance costs (costs that would occur recurrently over a much longer time period). For example, creation of new fencing around a site might occur within the 1st year (establishment cost) with maintenance or replacement occurring recurrently over the life of a Biobank site.

5.1.1 Initial Management requirements prior to land transfers

As part of the negotiated outcomes between the RTA and DECCW prior to the transfer of the subject lands as offsets, the RTA agreed to fund works associated with fencing boundaries, clean-up and rehabilitation of the sites, where relevant.

The cost of rehabilitation varied largely between sites and has been factored into the establishment costs for biobanking management actions.

5.1.2 Grazing Management/Human Disturbance (Fencing)

Private fencing contractors from the Western Sydney region were contacted to reach a consensus regarding costs for installation of fencing based on the type of fencing per metre. Since few contractors supply high tensile fencing, NSW NPWS estimates were used for this type of fencing.

Maintenance and replacement of fences was assumed to be required on an annual rotational basis whereby the entire fence is replaced once in every 20 years at most sites (areas with low-moderate risk of vandalism) and once in every 10 years for sites where the risk of vandalism was perceived as high (e.g. adjacent to housing estates).

Fencing has been costed for each site depending on the main aims of the fence and consideration of ownership of adjacent properties. Where the adjacent property is owned by a private land holder, only 50% of costs associated with construction and maintenance have been incorporated into overall costs. Conversely, if a fence is required adjacent to government owned land, 100% of the costs have been absorbed for construction and maintenance.

Four types of fence were considered with associated aims and situation:

- Stock proof fence – 4 or 5 stranded wire (or barbed-wire where already in place) fence with wooden posts and star-pickets, approximately 1.2 m high. Primarily aimed at keeping grazing stock out of a Biobank site where private rural property with on-site residents borders site. Standard stock proof fencing ranges from \$11-13/m to supply and install (Plate 1A);
- 6 foot chain mesh fencing - wire mesh attached to steel poles with 2 wires at the upper limits of poles. Aimed at keeping out 4WD and motorbike owners and reduce access to feral animals. Harder to cut through than stock proof fencing. Used where site borders area with public access with a moderate risk of vehicle incursion or for targeted feral management (e.g. deer or goats). Commercial providers advise ELA that 6 ft chain mesh fencing ranged from \$30-40/m to supply and install (depending on site conditions) with an average cost of \$35/m (Plate 1B);
- High tensile cable with "I" beam (1 cable) – high tensile steel cable (25mm or 40mm thick) through steel I Beams. Aimed at keeping out vehicles and motorbikes. Used where there is a high risk of incursion by vehicle owners (e.g. areas close to public access roads where there are few residences). Single 25mm cable at \$25/m (Plate 1C);
- High tensile cable with "I" beam (2 cables) – two high tensile steel cables through steel beams (plate 1c). Aimed at keeping out vehicles and motorbikes. Twin 40mm cable at \$95/m (Plate 1D).

(A) Stock proof fence (\$12.5/m)



(B) 6-ft chain mesh fence (\$30-40/m)



(C) 25mm High tensile steel & "I" Beam (\$25/m)



(D) 40mm High tensile dual cable (\$95/m)



Plate 1: Fencing types considered for Biobanking cost comparison study

5.1.3 Management trail establishment and/or removal

Management/access trails are needed to conduct certain management actions within Biobank sites (implementation of ecological burning and feral animal management within larger sites). In most cases trails were already present albeit degraded in some places.

Costing for trails was calculated using a generic price (after consultation with local NPWS staff and local earthworks contractors) for hire of machinery and labour/day, then estimating the number of days that would be required to upgrade a trail to a useable state depending on its length, underlying geology and level of degradation.

The frequency of trail upgrades (annual or once every 3-5 years) depended on the expected use of the trails. For private Biobank sites where site security is high and therefore inappropriate or unauthorised use was expected to be low, trail maintenance requirements would be low.

For Biobank sites where it has been assumed that the owner will live on site (e.g. Bents Basin and Horsley Park) and therefore have direct access to the Biobank site for management activities, no new access trails have been proposed. However, when cost estimates were discussed with NPWS staff, trails were costed for these sites as NPWS required access through the transferred component of the property for future management.

5.1.4 Rehabilitation and Weed Management

Clean up and rubbish removal was costed for Biobank sites as discussed in section 5.1.1. For some sites habitat rehabilitation is required in highly disturbed areas, which would include assisted revegetation constituting establishment of native vegetation (ground cover and trees) from local endemic plants through planting.

All sites would require management of existing weeds and the associated effort and timing would be dependent upon the severity of weed invasions at a site. Sites with heavily infested areas were allocated funds to allow for intensive weed removal within the initial years of management (establishment costs), based on the concept that once an infestation was removed less intense follow-up practices would be required in subsequent years (ongoing maintenance costs).

Specific and routine weed management activities for Biobank sites were determined during site visits and discussions with NPWS land managers to gauge the severity and type of weeds present at a site. Costs were calculated using site specific management activity requirements.

Cost calculation for rehabilitation and weed management activities was done by consulting bush regeneration staff within Eco Logical Australia and industry standards. Costs for specific actions are tabled below.

Activity	Specifications	Cost
Revegetation – planting of native ground covers	4 plants/square meter or 40,000 plants per ha	\$2-3 per plant
Revegetation – planting of native trees and shrubs	Shrubs 400 per ha Trees 100 per ha	\$4-5 per plant (with tree guard, fertilizer pellet & follow up watering)
Bush Regeneration. Spot spraying, cut and painting, hand-pulling of weeds	4 person team for 1 day. Includes transport, chemicals and associated consumable materials.	\$ 1,550/day

5.1.5 Ecological Burns for Biodiversity

Ecological burns would be required at all offsets sites to enhance biodiversity and help assist in weed control. Given the need to obtain permits and have access to specialist equipment and experienced practitioners, financial donations to the local RFS brigades were considered to be the most appropriate and cost effective means of achieving ecological fire management objectives.

Whilst the RFS routinely implements HR works at no costs to land holders, as Biobank sites are likely to be run on a business basis and the number of registered sites is likely to increase over time, the demands on local RFS brigades may increase and their ability to undertake burns at no cost as part of training exercises or implement burns with other competing priorities, a reasonable donation was considered an appropriate way of factoring a real costs for this activity.

5.1.6 Feral Animal Control

Fox and other vertebrate feral animal control programs (e.g. feral pigs, goats and deer) are required under a standard Biobanking Agreement regardless of the size or context of a site. The current threats to each of the subject sites was evaluated through site visits and communication with NPWS Staff.

For sites located adjacent to NPWS Reserves, an assumption was made that the costs of a pro rata expansion of the current programs (if any) operating within the Reserve would be applied to the Biobank site. The cost of existing feral animal control program within adjacent parks was provided by NPWS staff and the cost for the Biobank site was calculated on a pro-rata basis.

At sites where there was no adjacent NPWS Reserve, the cost of feral control was calculated by considering the requirements of Biobanking agreements, the likely threat to each site by feral animals (i.e. sites in near urban areas were unlikely to be impacted by feral goats, pigs or deer even though the credit report required these management activities), and the efficacy of implementing feral control programs based on site location and size (i.e. Fox control in small Biobank sites adjacent to rural residential areas where there were no records of ground dwelling threatened fauna species that would benefit from vertebrate pest control were not considered not justified unless a landscape approach to fox control was being undertaken by neighbours and other land management authorities (Local Government, RLPB, NPWS, Department of Lands).

The rationale behind the effort required (and associated cost calculations) for management of feral animals at each site has been explained in the site profiles in Section 4. The rates for contracting of shooters and other staff were determined through discussion with NPWS and RLPB staff.

5.2 OTHER COSTS (CREDIT COST PART B)

5.2.1 Biobank Assessment & Registration Costs

The commercial costs of preparing formal Biobank Assessments by accredited Biobank Assessors (vegetation mapping, biometric condition plots, credit calculations, credit assessment report and application and registration of a Biobank Agreement) were estimated to provide an indication of the costs to establish the 6 Biobank sites (Table 11). Table 11 indicates that whilst larger sites require greater levels of field work and thus expense, the cost to prepare the necessary reports (credit assessment report, Biobank site management plan and Biobank Agreement) is around the same, regardless of the size of the Biobank site. This means that the cost to generate credits at small Biobank sites will be proportionally higher than large sites.

Table 11 Estimates of the costs to formally assess and register the subject Biobank sites

	Rouse Hill	Horsley Park	Kemps Creek	Bents Basin	Girl Guides	Colebee
Biobank Area (ha)	2.11	2.99	12.85	17.84	41	54.57
No of vegetation Zones	2	2	3	2	6	4
Minimum No of Plots required (Table 4 of Ops Manual)	3	3	5	6	13	12
Site Assessment (Veg mapping, th species survey, plots, Credit Calcs & Assessment Report)	\$8,860	\$8,860	\$12,100	\$16,740	\$23,220	\$22,250
Mgt Plan preparation & Credit pricing	\$7,100	\$7,100	\$8,300	\$11,250	\$11,250	\$11,250
Preparation & registration of Biobank Agreement	\$4,780	\$4,780	\$5,400	\$5,400	\$5,400	\$5,400
Total (Excl GST)	\$20,740	\$20,740	\$25,800	\$33,390	\$39,870	\$38,900
GST	\$2,074.0	\$2,074.0	\$2,580.0	\$3,339.0	\$3,987.0	\$3,890.0
Total (incl GST)	\$22,814	\$22,814	\$28,380	\$36,729	\$43,857	\$42,790

5.2.2 Council Rates

Council rates were calculated by contacting relevant local councils. Councils generate rates for rural properties based on the dollar value of the lot multiplied by a specified constant. Where only a proportion of the lot was subject to the biobanking agreement, rates were adjusted according to the proportion of the lot the biobanking site occupied.

5.2.3 Livestock Health and Pest Authority (LHPA) Rates

LHPA rates are payable for properties within the Cumberland Plain that are greater than 10 hectares. For a 10 hectare property the minimum base rate is \$60/annum, rates of \$0.50 are payable on every hectare of land over 10 hectares.

5.2.4 Administrative Costs

A Biobank site owner is required to undertake a number of administrative costs on an annual basis including:-

- Annual audit compliance fee to DECCW (\$1,122);
- Monitoring the implementation of the Biobank site management plan and periodic review (up to \$5,000 every 3-6 years);
- Annual reporting to DECCW (up to \$2-3,000 per year) depending on complexities and amount of reporting required; and
- Business administration cost (book keeping, accounts etc up to \$2,500 per year).

It is also recommended that Biobank site owners take out appropriate insurance cover to provide for the replacement costs of boundary fencing or reconstruction of management trails in the event of fires, floods and other damage.

These annual overheads can add significantly to the costs of managing a Biobank site, particularly for small sites

A description of the current condition and management requirements for each of the 6 sites is provided in Section 4 of this report.

5.3 CREDIT SALES PRICE

The Credit Cost Part A and Part B for each site was then used to calculate a range of potential credit prices for ecosystem and species credits.

5.3.1 Ecosystem Credits

The sales price of ecosystem credits is based on a combination of the number of credits generated at the Biobank site, the in perpetuity management costs, establishment costs, lost opportunity costs and other profit/risk margins as outlined in Appendix 5.

The lost opportunity costs largely relate to land values and to what extent these are factored into credit sales price.

In this case study, land values were based on the price paid by the RTA as a robust indication of the current market land value of environmentally constrained land although it is noted that in this particular case, the RTA was a "desperate" buyer and the current land owners were not necessarily "willing" sellers. This may have had a significant influence on the land values paid.

At this point in time, until a robust credit trading market has been established, it is difficult to predict to what extent Biobank site owners will factor in land values to their credit sales price.

Based on discussions with many land owners considering Biobanking, there is a current belief that the risks (in particular future management requirements and the ability for the Trust Fund to generate sufficient returns) will be high, reporting expectations by DECCW will be high, and that land values will be significantly affected by Biobank Agreements on title etc, so it is more than likely than Biobank site owners will factor in all or at least a high proportion of current land values into their credit sales prices, at least initially.

However, once a market has become established, there are a range of Biobank sites offering the same credits, management practices improve and there is competition in the market place, the proportion of land value factored into credit prices is likely to fall. Further, if Biobank site owners structure their

Biobank sites to maintain any existing dwelling entitlements, based on the VCA experience, there is likely to be a niche industry of Biobank site owners who value Biobank site highly as a source of self employment and steady income.

For this reason, a range of credit sales prices have been provided for this project.

1. Biobank establishment and in perpetuity management costs only
2. Biobank establishment, in perpetuity management costs and 25% of the estimated land market value
3. Biobank establishment, in perpetuity management costs and 50% of the estimated land market value
4. Biobank establishment, in perpetuity management costs and 75% of the estimated land market value
5. Biobank establishment, in perpetuity management costs and 100% of the estimated land market value

Table 12 and Figures 7 & 8 provide details of the cost of ecosystem credits for each of the 6 offset sites. The cost are based on a combined value for all ecosystem credits generated (i.e. they do not vary between the different types of ecosystem credits as whilst the Biobank site generally have 2 or more vegetation types present, the condition and management requirements are very similar. For example the cost to manage 20 hectares of Grey Box-Forest Red Gum at Colebee in moderate to good condition is very similar to the cost of managing 20 ha of Broad-leaved Ironbark-Melalueca decora open forest on the same Biobank site in the same condition.

It is noted that the cost to generate ecosystem credits is significantly higher for the smaller Biobank sites (Rouse Hill, Horsley Park and Kemps Creek). This is partially due to fact that many of the management costs (rabbit control, implementation of ecological burns etc) do not increase proportionally to area. For example the cost to undertake and ecological burn for a 2 ha site is as much as for a 10-20 ha site. As small site can only generate a small number of credits, the cost per credit increases significantly for small Biobank sites. Additionally, the administrative overheads (Annual fees, reporting and business management costs) also do not increase proportionally with Biobank area and add significantly to the cost for small Biobank sites.

It is also important to note the influence that land values have on credit prices for all sites except Girl Guides where a relatively minor inclusion of land value (25% of market rate) doubles the credit value. In rural areas where land values are low, the influence of land value on credit prices will be minimal in comparison.

Table 12 Ecosystem credit prices per credit generated

Cost per Credit	Rouse Hill (2ha)	Horsley Park (3ha)	Kemps Creek (13ha)	Bents Basin (18ha)	Girl Guides (41ha)	Colebee (55ha)
Biobank Area (ha)	2.11	2.99	12.85	17.84	41	54.57
Total Fund Deposit	\$401,547	\$447,319	\$700,000	\$1,189,259	\$1,056,357	\$2,373,000
No. of Ecosystem Credits Generated	16	22	102	118	316	440
In perpetuity mgt costs only	\$31,708	\$25,642	\$8,560	\$12,511	\$4,166	\$6,587
25% market land value	\$62,958	\$40,983	\$14,565	\$12,954	\$4,734	\$11,118
50% market land value	\$94,208	\$56,324	\$20,570	\$13,397	\$5,301	\$15,618
75% market land value	\$125,458	\$71,665	\$26,575	\$13,841	\$5,869	\$20,181
100% market land value	\$156,708	\$87,006	\$32,580	\$14,284	\$6,437	\$24,712

Figure 7 Ecosystem credit prices in relation to Biobank size and land value

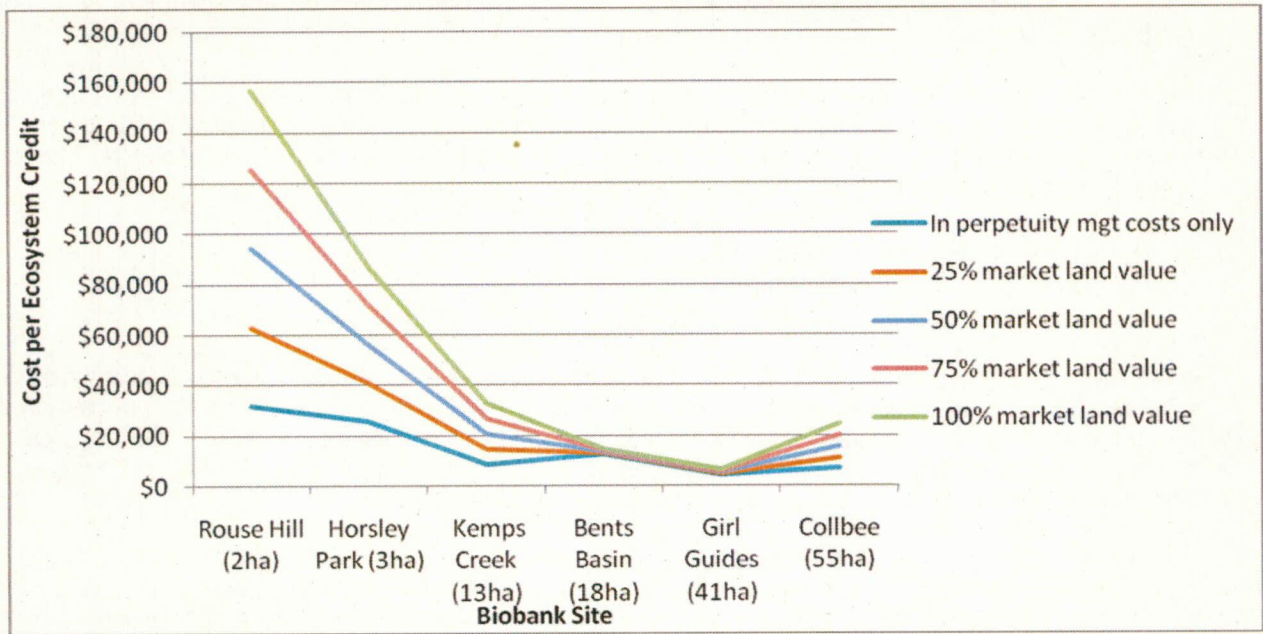
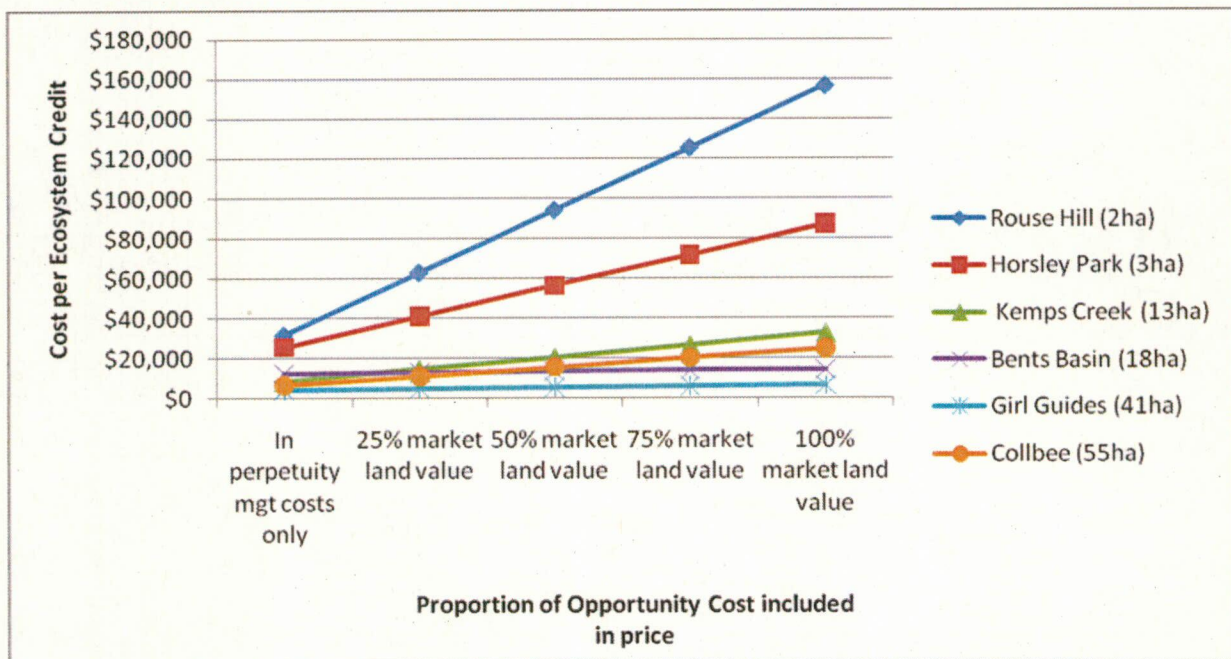


Figure 8 Ecosystem Credit price in relation to proportion of land value included in credit price



5.3.2 Species Credits

Whilst many species credits do not require any additional management activity over and above that required to meet the management obligations for the generation of ecosystem credits, it is considered that Biobank sites that can provide species credits as well as ecosystem credits have an inherently higher value than Biobank sites than can only supply ecosystem credits. These sites will therefore be more attractive to potential buyers as all of the credit requirements can be met at a single site and as part of a single price negotiation.

In this case study, the impacts of the M7 required a number of species credits to be retired in addition to ecosystem credits. Furthermore, several of the selected offset sites were able to generate species credits, including species required for the offset.

As the species credits being generated at these particular sites did not require any additional management action (all were for threatened flora in the shrub layer and therefore adequately catered for in the weed control, grazing management and ecological burn provisions for the ecosystem credits), three options for valuing these credits were explored:

- Ignore species credits (as per Table 12)
- Value species credits separately (Table 13); and
- Reduce the cost of ecosystem credits by the value of species credits (Table 14)

As in the majority of cases, there were no additional management requirements for species credits, it was decided to value species credits with a nominal value that reflected their rarity i.e. species credits that are extremely scarce and are likely to be difficult to supply to the credit market (e.g. endangered and critically endangered species) were allocated a higher value than those species likely to be more locally abundant and more readily available as credits e.g. vulnerable species.

Further, as the way the assessment methodology calculates species credits is quite different to ecosystem credits, that is between 5-12 ecosystem credits are typically generated per hectare of Biobank area (depending on condition) whilst species credits can be as high as a 1000 per hectare, the suggested pricing of species credits needs to consider how the pricing affects the overall cost of securing credits.

With this in mind, the following prices for species credits are suggested for the six M7 offset sites (Table 13). When the value of the species credits is incorporated into the TFD for ecosystem credits, the resulting reduction in the cost of ecosystem credits can be seen in Table 14.

Table 13 Suggested prices for species credits

Species Credits	Rouse Hill	Horsley Park	Kemps Creek	Bents Basin	Girl Guides	Colebee	No	\$/Credit	Value
Acacia pubescens			60				60	\$50	\$3,000
Pimelia spicata		450					450	\$100	\$45,000
Dillwynia tenuifolia						15000	15000	\$10	\$150,000
Grevillea juniperina						30000	30000	\$10	\$300,000
Putenaea parviflora						15000	15000	\$10	\$150,000
Square-tailed Kite				102	180		282	\$10	\$2,820
Total	0	450	60	102	180	60000	60792		\$650,820
Value	\$0	\$45,000	\$3,000	\$1,020	\$1,800	\$600,000			

Table 14 Reduced Ecosystem Credit prices after combining cost of Ecosystem and Species Credits into TFD

Credit Cost Options	Rouse Hill	Horsley Park	Kemps Creek	Bents Basin	Girl Guides	Colebee
Biobank Area (ha)	2.11	2.99	12.85	17.84	41	54.57
Total Fund Deposit	\$401,547	\$447,319	\$700,000	\$1,189,259	\$1,056,037	\$2,373,000
Species Credits Value	\$0	\$45,000	\$3,000	\$1,020	\$1,800	\$600,000
Ecosystem Credit Value	\$401,547	\$402,319	\$697,000	\$1,188,239	\$1,054,237	\$1,773,000
No. of Ecosystem Credits Generated	16	22	102	118	316	440
In perpetuity mgt costs only	\$31,708	\$23,187	\$8,516	\$12,501	\$4,159	\$4,945
25% market land value	\$62,958	\$38,528	\$14,521	\$12,944	\$4,727	\$9,476
50% market land value	\$94,208	\$53,869	\$20,526	\$13,387	\$5,294	\$13,976
75% market land value	\$112,458	\$69,210	\$26,531	\$13,830	\$5,862	\$18,539
100% market land value	\$156,708	\$84,551	\$32,535	\$14,273	\$6,430	\$23,070

Where a Biobank site is able to generate multiple species credits (e.g. Colebee) the inclusion of the species credit value in the TFD results in the price of ecosystem credits reducing quite significantly from \$6,587 (Table 12) to \$4,945 (Table 14) i.e. a 25% reduction. The reduction in price for other sites, e.g. the Horsley Park site, where the number of species credits is a lot lower, \$25,642 to \$23,187 is only a 10% reduction.

6 Costs to secure Biodiversity Credits for the M7

Using the credit pricing information for each of the 6 potential Biobank sites, a number of analyses to estimate the cost to secure the required offsets for the M7 have been undertaken

6.1 PURCHASE OF ALL ECOSYSTEM CREDITS GENERATED

Table 15 provides a summary of the cost to purchase all ecosystem credits generated (total 1,014) at the six offset sites under a range of potential credit pricing options (using credit prices from Table 12). If the Biobank site owners only include the establishment and in perpetuity management costs in their pricing (i.e. the minimum credit sales price allowed in the Biobanking Scheme to ensure that adequate funds are available for in perpetuity management) the cost to purchase all ecosystem credits (\$7.635M) is significantly less than the cost incurred by the RTA (\$18.125M) in purchasing and transferring the offsets and capital works funds to DECCW in accordance with the conditions of the compensatory habitat package.

If, however, the Biobank site owners incorporate a lost opportunity cost such as land value into their credit sales price, the cost of purchasing the credits increasing significantly and exceeds the cost of the offset package provided by the RTA once 75% or more of the land value is incorporated.

It is noted that of the 1,014 credits generated, only 648 are of a class that matches the credit profiles for the impacts of the M7.

Table 15 Cost to secure all Ecosystem Credits generated at the six M7 Offset sites

	Rouse Hill	Horsley Park	Kemps Creek	Bents Basin	Girl Guides	Colebee	Total
No. of Ecosystem Credits Generated	16	22	102	118	316	440	1,014
In perpetuity mgt costs only	\$507,328	\$564,124	\$873,120	\$1,476,298	\$1,316,456	\$2,898,280	\$7,635,606
25% market land value	\$1,007,328	\$901,626	\$1,485,630	\$1,528,572	\$1,495,944	\$4,891,920	\$11,311,020
50% market land value	\$1,507,328	\$1,239,128	\$2,098,140	\$1,580,846	\$1,675,116	\$6,871,920	\$14,972,478
75% market land value	\$2,007,328	\$1,576,630	\$2,710,650	\$1,633,238	\$1,854,604	\$8,879,640	\$18,662,090
100% market land value	\$2,507,328	\$1,914,132	\$3,323,160	\$1,685,512	\$2,034,092	\$10,873,280	\$22,337,504

6.2 PURCHASE REQUIRED NUMBER OF ECOSYSTEM CREDITS

The 6 offset sites do not generate enough credits to meet the offset requirements for the M7 project (2,946 ecosystem credits are required, refer to Table 2). Table 16 provides an analysis of the costs to secure the required number of credits (2,946) from each of the Biobank sites assuming that each of the offset site had the correct number and type of credits (using credit prices from Table 12).

Table 16 Cost to secure required number of ecosystem credits assuming correct type & number of credits are available

	Rouse Hill	Horsley Park	Kemps Creek	Bents Basin	Girl Guides	Colebee
Biobank Area (ha)	2.11	2.99	12.85	17.84	41	54.57
No of Ecosystem Credits required	2946	2946	2946	2946	2946	2946
In perpetuity mgt costs only	\$93,411,768	\$75,541,332	\$25,217,760	\$36,857,406	\$12,273,036	\$19,405,302
25% market land value	\$185,474,268	\$120,735,918	\$42,908,490	\$38,162,484	\$13,946,364	\$32,753,628
50% market land value	\$277,536,768	\$165,930,504	\$60,599,220	\$39,467,562	\$15,616,746	\$46,010,628
75% market land value	\$369,599,268	\$211,125,090	\$78,289,950	\$40,775,586	\$17,290,074	\$59,453,226
100% market land value	\$461,661,768	\$256,319,676	\$95,980,680	\$42,080,664	\$18,963,402	\$72,801,552

Note: Shaded cells indicate total cost less than \$18.125M

Under this scenario it is noted that in all but the Girl Guides offset site, the cost to purchase and retire the number of credits required is significantly greater than the cost incurred by the RTA to purchase and transfer the 6 properties to the DECCW (Approx \$18.125M as per Table 1) even when in perpetuity management cost only are included in the credit sales price. If any land value is incorporated into the credit price, the cost to secure the offsets is significantly greater than the value of the offset package.

Again, in this scenario, none of the offset sites secured are capable of providing all of the correct ecosystem credit types required according to the credit profiles.

This analysis shows that securing ecosystem credits is significantly more expensive from small Biobank sites (where the cost of management and administrative overheads contribute disproportionately to the cost of each credit); and that if the Biobank site owner choose to include any opportunity costs in the credit pricing, this significantly adds to the cost. However, it should be noted that in order to secure around 3,000 ecosystem credits from any one particular site as in the analysis in Table 16, the Biobank sites would be significantly larger, around 450-500 ha in size, would most likely have a rural zoning and the cost to generate each credit, if assessed for a 450-500 ha site rather than the 2-50 ha sites in this study, would be significantly lower. Estimates of credit prices for properties in this size range (not including land value) undertaken by ELA have been in the range \$500-\$2,500 (ELA unpublished data) compared to the lowest credit price of \$4,166 in this study (Girl Guides Table 12).

As the 6 offset sites purchased by the RTA do not support the correct type or number of credits required to meet the offset requirements as determined by the credit calculator, Table 17 provides a summary of the cost to purchase all of the available credits of the correct types and the likely cost to purchase the remaining credits required assuming they would be available from other similar Biobank sites.

Table 17 Cost to purchase all required ecosystem credits of the correct type (Mgt Cost only)

Credit Types	No of Credits Required	No of Credits Available	Cost#	Additional Credits required	Likely Cost#
Forest Red Gum - Rough-barked apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	658	9	\$230,778	649	\$16,641,658
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	2,265	363	\$3,223,780	1,902	\$12,528,474
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest on the edges of the Cumberland Plain, Sydney Basin	23	276	\$95,818	0	
Total	2,946	648	\$3,550,376	2,551	\$29,170,132

assuming that remaining credits are purchased from the cheapest available source, for example, additional Grey Box-Forest Red Gum credits being purchased from the Colebee site not Rouse Hill, Horsley Park or Kemps Creek.

If the RTA was required to only purchase the correct types of credits, based on the figures in Table 17, the cost to secure the required offsets for the M7 may have been around \$32.5M (Mgt cost only) compared to \$7.635M (Table 15) or \$19.4M (Table 16). However, there would be surplus ecosystem credits that could be sold to offset this higher cost.

6.3 PURCHASE OF SPECIES CREDITS

Table 18 shows the cost of securing only those species credits required (if available) and the surplus value of any additional species credits that can be sold on the credit market at a later stage.

Under this scenario, the cost of securing the required species credits from the Biobank sites is \$408,130, however, there is a shortfall of 2,050 *Pimelia spicata* credits and 5,130 *Grevillea juniperina* credits. Assuming that other Biobank sites have these credits available at a similar cost, an additional cost of \$256,800 would be required (Total \$664,930), although this could be offset if the surplus credits are sold (surplus credit value \$242,690) reducing the additional cost to \$422,240.

Table 18 Cost to secure required number of species credits

Species credits Required	No. Required	\$ per Credit (Table 13)	No. Available	Cost to secure required and available credits	Shortfall in required credits	Cost to secure shortfall credits	Surplus Credits to be sold	Value of surplus credits
<i>Acacia pubescens</i>	19	\$50	60	\$950	0	\$0	41	\$2,050
<i>Pimelia spicata</i>	2,500	\$100	450	\$45,000	2,050	\$205,000	0	\$0
<i>Dillwynia tenuifolia</i>	6,218	\$10	15,000	\$62,180	0	\$0	8,782	\$87,820
<i>Grevillea juniperina</i>	35,180	\$10	30,000	\$300,000	5,180	\$51,800	0	\$0
<i>Pultenaea parviflora</i>	0	\$10	15,000			\$0	15,000	\$150,000
Square-tailed Kite	0	\$10	282			\$0	282	\$2,820
Total Cost				\$408,130		\$256,800		\$242,690

6.4 MODIFIED ECOSYSTEM CREDIT PRICES

If the analysis in Section 6.1 and 6.2 are repeated using the reduced ecosystem credit prices from Table 14 (i.e. following the removal of the value of species credits generated at the same site), the following comparative costs are obtained (Table 19, 20 & 21).

Table 19 Cost to secure all Ecosystem Credits generated at the six M7 Offset sites after deducting value of species credits

Credit price	Rouse Hill	Horsley Park	Kemps Creek	Bents Basin	Girl Guides	Colebee	Total
No. of Ecosystem Credits Generated	16	22	102	118	316	440	1,014
In perpetuity mgt costs only	\$507,328	\$510,114	\$868,632	\$1,475,118	\$1,314,244	\$2,175,800	\$6,851,236
25% market land value	\$1,007,328	\$847,616	\$1,481,142	\$1,527,392	\$1,493,732	\$4,169,440	\$10,526,650
50% market land value	\$1,507,328	\$1,185,118	\$2,093,652	\$1,579,666	\$1,672,904	\$6,149,440	\$14,188,108
75% market land value	\$2,007,328	\$1,522,620	\$2,706,162	\$1,631,940	\$1,852,392	\$8,157,160	\$17,877,602
100% market land value	\$2,507,328	\$1,860,122	\$3,318,570	\$1,684,214	\$2,031,880	\$10,150,800	\$21,552,914

Table 20 Cost to secure required number of ecosystem credits assuming correct type & number of credits are available after deducting value of species credits

Credit price	Rouse Hill	Horsley Park	Kemps Creek	Bents Basin	Girl Guides	Colebee
No of Ecosystem Credits required	2,946	2,946	2,946	2,946	2,946	2,946
In perpetuity mgt costs only	\$93,411,768	\$68,308,902	\$25,088,136	\$36,827,946	\$12,252,414	\$14,567,970
25% market land value	\$185,474,268	\$113,503,488	\$42,778,866	\$38,133,024	\$13,925,742	\$27,916,296
50% market land value	\$277,536,768	\$158,698,074	\$60,469,596	\$39,438,102	\$15,596,124	\$41,173,296
75% market land value	\$369,599,268	\$203,892,660	\$78,160,326	\$40,743,180	\$17,269,452	\$54,615,894
100% market land value	\$461,661,768	\$249,087,246	\$95,848,110	\$42,048,258	\$18,942,780	\$67,964,220

Note: Shaded cells indicate total cost less than \$18.125M

Table 21 Cost to purchase all available ecosystem credits of the correct type (Mgt Cost only) after deducting value of species credits

Ecosystem Credit type	No of Credits Required	No of Credits Available	Cost#	Additional Credits required	Likely Cost#
Forest Red Gum - Rough-barked apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	658	9	\$208,683	649	\$15,048,363
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	2,265	363	\$2,799,068	1,902	\$9,405,390
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest on the edges of the Cumberland Plain, Sydney Basin	23	276	\$95,657	0	
Total	2,946	648	\$3,103,408	2,551	\$24,453,753

Tables 19, 20 & 21 illustrate that where there are significant numbers of species credits being generated at Biobank sites (e.g. Colebee), this can have a significant influence on reducing the price of species credits, and if not all species credits are required to offset a particular impact, they can be sold to offset other impacts.

7 Conclusions

The analysis undertaken in this study indicates that the comparative cost of securing offsets using the Biobanking methodology can be more cost effective than the traditional approach where land is purchased and transferred to a public authority land manager (usually DECCW or local Council), however, this depends on a number of factors including the following:

- Size of the Biobank site. Large Biobank sites, >40 ha in area, can generate credits significantly more cost effectively than smaller Biobank sites, 5-10ha in area. This is largely due to the economies of scale as well as the ability to distribute the administrative overheads associated with managing and reporting in accordance with the Biobank Agreement across a greater number of credits. Of the 6 offset sites selected; Colebee (54 ha), Girl Guides (41 ha) and Bents Basin (18 ha) were able to generate credits at prices up to a 10 times lower than the smaller Biobank sites;
- Condition of the Biobank site. Biobank sites that are in moderate condition, and can be improved at low management cost, will generate significantly more credits (10-12 credits per hectare) than Biobank sites in "benchmark" condition (5-7 credits per hectare). The more credits that can be generated at a Biobank site reduces the average cost per credit. However, sites in poor condition are likely to result in much higher management costs, for example, whilst the Bents Basin sites was approximately half the area of the Girl Guides site, it's TFD was higher due to more complex weed management issues;
- Location of Biobank site in relation to other land uses. The further away from existing infrastructure and growth areas a Biobank site is the more likely that the underlying land values will be lower. In this study, the Girl Guides and Bents Basin sites which were the most distant from the impact site and current/planned growth areas, had the lowest land values. Whilst the Colebee site was the largest Biobank site, its land values were still relatively high. Lower land values and the ability to carry out other activities on or adjacent to a Biobank site without comprising the primary objectives of improvements in biodiversity values provides the Biobank site owner the opportunity to factor in lower opportunity costs to credit prices;
- Proportion of land title registered as a Biobank site. If a Biobank site can be registered on part of a land title and other high value uses can continue to operate on the remaining part such as rural development (e.g. Girl Guides, Bents Basin and Horsley Park sites), this has the capacity to maintain the overall "land value" of the property and addresses the perception, that registration of a Biobank Agreement will "sterilise" land value and other uses; and

The results illustrate one of the main principles underlying the Biobanking scheme, that is, it has been designed to encourage development close to existing infrastructure where land values are high and conservation areas are likely to be small and less viable, and promotes conservation in areas where land values are lower, usually some distance from growth areas, conservation values are likely to be higher and viable in the long term (DECC 2008).

However, in western Sydney, where land values are high, the ability to find large Biobank sites, in areas with lower land values that are capable of generating the right types of credits is limited. Whilst there are plenty of opportunities to establish cost effective Biobank sites in areas supporting sandstone vegetation types, the vegetation of the Cumberland plain, largely listed as endangered or critically endangered, is restricted to the Cumberland Plain and land holdings are either generally small (< 10ha) and/or have a high value because of the potential for future urban development.

Landholders who are able to supply credits from larger sites which are not included in future growth plans are likely to be heavily in demand.

Valuing ecosystem credits only, biobanking would have been slightly more expensive to achieve the same level of conservation as the six offset sites provided (\$22.337M relative to \$18.125M). One offset site generated credits at a low enough price to suggest that buying credits via the biobanking scheme could have been cheaper. However, purchasing all of the ecosystem credits required to offset the impact of the M7 would still have cost 60% more than paid by the RTA (i.e. \$29.170M relative to \$18.125M).

Including the species credits value into the value of ecosystem credits reduces the cost of achieving the same level of conservation as the six offset sites provided (i.e. from \$22.337M to \$21.552M). Two offset sites generate credits at a low enough price to suggest that buying credits via the biobanking scheme could have been cheaper. The cost to purchase all of the ecosystem credits required to offset the impact of the M7 also comes down to only 34% more than paid by the RTA (i.e. \$24.453M relative to \$18.125M).

Finally, a robust credit trading market with multiple providers, as illustrated in the difference between the estimated credit prices of the 6 Biobank sites in this study, is likely to provide competition and drive innovation and best practice in Biobank site management and administration, leading to more competitive and affordable credits.

Glossary of Biobanking Terminology

This glossary has been extracted from the Biobanking Assessment Methodology and Credit Calculator Operational Manual (DECC 2009)

Accredited assessor this is a person who has been accredited in accordance with s. 142B(1)(c) of the TSC Act to use the methodology and credit calculator.

benchmarks (vegetation benchmarks) Quantitative measures of the range of variability in vegetation condition where there is relatively little evidence of modification by humans since European (post-1750) settlement. Benchmarks are defined for specified variables for vegetation communities. Vegetation with relatively little evidence of modification generally has minimal timber harvesting (few stumps, coppicing, cut logs), minimal firewood collection, minimal exotic weed cover, minimal grazing and trampling by introduced or overabundant native herbivores, minimal soil disturbance, minimal canopy dieback and no evidence of recent fire or flood. It is not subject to high-frequency burning and has evidence of recruitment of native species. Benchmarks are available by vegetation class (*sensu* Keith 2004) at <http://www.environment.nsw.gov.au/projects/BiometricTool.htm> and can also be obtained from reference sites or published sources.

biobanking agreement An agreement between the landowner and the Minister for Climate Change and the Environment (under Part 7A of the TSC Act) for the purpose of establishing a biobank site. The agreement states the management actions to be carried out to improve biodiversity values on the site and thereby create biodiversity credits under the scheme (s. 127D of the TSC Act).

biobank site Land designated by a biobanking agreement to be a biobank site. This term is also used in the Operational Manual for land that is being assessed as a biobank site

biobanking statement A statement issued under s. 127ZL of the TSC Act, specifying the number and class of credits to be retired for a particular development in accordance with the methodology. The statement may include other conditions to minimise the impact of the development on biodiversity values. If provided to consent or determining authority under the EP&A Act, the statement must be included as a condition of development consent or approval.

biodiversity credits Ecosystem or species credits required to offset the loss of biodiversity values on development sites or created on biobank sites from management actions that improve biodiversity values.

biodiversity values Include composition, structure and function of ecosystems, and include (but are not limited to) threatened species, populations and ecological communities and their habitats, as defined by the TSC Act, and exclude fish or marine vegetation, unless that fish or marine vegetation has been the subject of an order under s. 5A of the TSC Act.

cleared land Where the native over-storey has been cleared, there is no native mid-storey (or the native mid-storey has been cleared), and less than 50% of the ground cover vegetation is indigenous species or greater than 90% of the ground cover (dead or alive) is cleared.

CMA area The area of operation of a catchment management authority, as described in Schedule 2 of the *Catchment Management Authorities Act 2003*.

CMA sub-region Sub-regions of catchment management authority areas as set out in the Environmental Outcomes Assessment Methodology, Native Vegetation Regulation 2005.

Credit Calculator A computer program that applies the methodology and calculates the number and classes of credits required at a development site or created at a biobank site.

credit profile A description of the credit created or required in a vegetation zone or group of zones, according to the attributes of CMA sub-region, vegetation type, vegetation formation, surrounding vegetation cover, and patch size including low-condition vegetation.

critically endangered ecological community As defined in s. 4(1) of the TSXC Act and any additional critically endangered ecological communities listed under Part 13 of the EPBC Act.

development site An area of land that is subject to a proposed development proposal for which a biobanking statement is sought or obtained.

ecosystem credits The class of biodiversity credits created or required for the impact on general biodiversity values and some threatened species, i.e. for biodiversity values except threatened species or populations that require species credits. Species that require ecosystem credits are listed in the Threatened Species Profile Database (TSPD).

endangered ecological community As defined in s. 4(1) of the TSXC Act and any additional endangered ecological communities listed under Part 13 of the EPBC Act. Endangered and critically endangered ecological communities are collectively referred to as EECs.

low-condition vegetation Woody native vegetation with native over-storey percent foliage cover less than 25% of the lower value of the over-storey percent foliage cover benchmark for that vegetation type, and

- less than 50% of ground cover vegetation is indigenous species, or
- greater than 90% of ground cover vegetation is cleared.

Native grassland, wetland or herbfield where:

- less than 50% of ground cover vegetation is indigenous species, or
- more than 90% of ground cover vegetation is cleared.

If native vegetation is not in low condition, it is in moderate to good condition.

Methodology means the Biobanking Assessment Methodology.

moderate to good condition vegetation Native vegetation that is not in low condition, as defined in section 2.1.1 of the methodology.

native vegetation Vegetation described in section 6 of the NV Act. Native vegetation is used as a surrogate for general biodiversity values in the methodology.

Operational Manual Means the Biobanking Operational Manual, which provides guidance on how to use the credit calculator and undertake surveys.

red flag area An area of land at the development site with high biodiversity conservation values where the impact of the development on biodiversity values cannot be offset by the retirement of biodiversity credits in order to improve or maintain biodiversity values, unless the Director General determines that strict avoidance of the red flag area is unnecessary in the circumstances.

reference sites Relatively unmodified sites used to obtain local benchmark information when benchmarks in the Vegetation Benchmark Database are too broad or otherwise incorrect for the vegetation type and/or local situation. Benchmarks can also be obtained from published sources.

retirement of biodiversity credits A change in the status of a credit such that the credit can no longer be bought or sold. Retirement of credits may be required to comply with a biobanking statement or a direction issued by the Minister for Climate Change and the Environment, or they may be retired voluntarily.

Site Value A quantitative measure of structural, compositional and functional condition of native

Vegetation Benchmarks Database A database of benchmarks for vegetation classes and some vegetation types. Vegetation benchmarks can also be collected from reference sites.

vegetation class Level of classification of vegetation communities defined in *Ocean Shores to Desert Dunes: the Native Vegetation of New South Wales and the ACT* (Keith, D. 2004, Department of Environment and Conservation NSW, Hurstville, NSW). There are 99 vegetation classes in NSW.

vegetation formation A broad level of vegetation classification, as defined in *Ocean Shores to Desert Dunes: the Native Vegetation of New South Wales and the ACT* (Keith, D. 2004, Department of Environment and Conservation NSW, Hurstville, NSW). There are 12 vegetation formations in NSW.

vegetation type The finest level of classification of native vegetation used in the methodology. Vegetation types are assigned to vegetation classes, which in turn are assigned to vegetation formations. There are approximately 1600 vegetation types within NSW.

References

DECC (2007) Biobanking. Biodiversity Banking and offsets Scheme. Scheme Overview Scheme Overview. Department of Environment & Climate Change. Sydney, NSW. November 2007

DECC (2009). Biobanking Assessment Methodology and Credit Calculator Operational Manual. NSW Department of Environment and Climate Change. (March 2009)

DECCW (2009). Guide to establishing a Biobank site. Department of Environment, Climate Change and Water, Sydney, NSW. September 2009.

NPWS (2000) Native vegetation Maps of the Cumberland Plain, Western Sydney. Sydney Zone, NSW National Parks and Wildlife Service, Hurstville.

NPWS (2001) Director-General's Decision Report. Request for Concurrence. Western Sydney Orbital . NSW National parks and wildlife Service, Hurstville, NSW. August 2001.

Appendix 1: Compensatory habitat requirements for M7 approval

The conditions of concurrence required the RTA to negotiate a compensatory habitat package (offset package) with the Director-General of the then NPWS based on the following criteria:-

The RTA must negotiate a habitat compensation package with the Manager CPPD, Central Directorate. The compensation package is to include the acquisition and transfer of lands and/or funds for rehabilitation and management to the NPWS, and may also include funds for revegetation of cleared land where sufficient intact habitat cannot be purchased to meet the requirements of the compensation package. The principles of this habitat package are detailed in section 2.3.7 of this concurrence report. The compensation package must be formally agreed to by the Manager CPPD, Central Directorate, prior to the commencement of clearing for construction of the proposal.

1. *Compensatory habitat requirements shall be calculated at a ratio of at least 2:1 for purchase of existing habitat. That is, at least two hectares of existing habitat shall be purchased for each hectare of habitat that is cleared. The relative amounts of each community so purchased shall, as closely as is practicable, mirror the relative areas of each community or species habitat that is to be cleared.*
2. *Compensatory habitat shall, where possible, include habitat and/or populations of the threatened species that are to be impacted by the proposal, as discussed above.*
3. *The NPWS preliminary estimate of endangered ecological community to be lost, directly and indirectly, as a result of this proposal is 75.5Ha. As discussed elsewhere in this report, it is noted that the NPWS has been unable to estimate the indirect effects of flooding or flood mitigation measures in the Prestons area (SIS sites 6 and 7). Nor has it been able to estimate the indirect impacts, due to sedimentation, erosion, etc, downslope from SIS site 20. Similarly, if further assessments under the Environmental Planning and Assessment Act 1979 allow for ancillary infrastructure to impact on threatened species or ecological communities, these impacts should be ameliorated through this compensatory habitat package. Therefore, the final total of endangered ecological community to be lost (on which the final compensatory package shall be based) may be higher.*
4. *Priorities for compensatory habitat purchase shall be as follows:*
 - *Properties identified in the representations report as compensatory habitat;*
 - *Habitat within 10km of the route of the WSO;*
 - *Habitat adjacent to existing conservation or other public reserves;*
 - *Habitat identified in the NPWS conservation significance assessment (conducted for the Cumberland plain endangered ecological communities recovery plan) as 'core habitat' or 'support for core habitat';*
 - *Habitat under imminent and significant threat.*
5. *Where it is not possible to purchase existing habitat at a ratio of 2:1, a minimum ratio of 1:1 shall be purchased and the balance of compensation be revegetation of areas at a ratio of up to 20:1. It is expected that the budget for this revegetation will be in the order of \$5000 per hectare over 3 years, based on costs for revegetation work conducted by Greening Australia in the Hoxton Park Corridor. Ongoing management will need to be negotiated by the RTA with the relevant land manager.*

6. *Priorities for revegetation shall be as follows:*

- *Land within 10km of the route of the WSO;*
- *Habitat adjacent to existing conservation or other public reserves;*
- *Land identified in the NPWS conservation significance assessment as 'candidate corridor paths';*
- *In order of priority - Private land (this will require negotiation of a conservation measurement such as a covenant or a conservation agreement); Land owned by Council or Government agency other than DUAP or the NPWS; Land owned by DUAP or the NPWS.*

7. *Establishment and management costs for lands transferred to NPWS shall be provided in the compensation package negotiated. It is expected that these costs shall be in the order of \$8000 per hectare of reserve (based on the financial impact statement for Kemps Creek Nature Reserve).*

Establishment and management costs for lands transferred to other agencies shall be provided in the compensation package negotiated

Appendix 2: Credit reports for M7 impact sites

1. Sydney Metro CMA Impact Assessment
2. Hawkesbury-Nepean CMA Impact Assessment

BioBanking

Biodiversity Banking and Offsets Scheme

Biobanking Credit Report

This report identifies the number and type of credits required at a DEVELOPMENT SITE.

Date of report: 12/11/2009 Time: 15:00 Tool Version: 1.1

Development Details

Proposal ID: 1234/2009/D002
Development Name: M7 Motorway metro CMA
Development Location: Around Sydney
Development Address:

CMA: Sydney Metro

Proponent Name: RTA
Proponent Address:
Proponent Phone:

Assessor Name: Meital Winter
Assessor Address: DECC, Hurstville
Assessor Phone: 02 9585 6905
Assessor Accreditation Number: 1

The following information is required to be submitted with this BioBanking Statement (where ticked)

- Local reference data is required for the following vegetation zones**
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin
- An Expert Report for the following species**
- The minimum number of plots were not entered for the following vegetation zones**

Department of Environment & Climate Change NSW

Improving or maintaining biodiversity values

The proposal has 1 or more Red Flag areas, as listed below.

Red Flag	Reason
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	Vegetation type being > 70% cleared; Vegetation type contains an endangered ecological community;
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Vegetation type being > 70% cleared; Vegetation type contains an endangered ecological community;
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin	Vegetation type being > 70% cleared; Vegetation type contains an endangered ecological community;
Spiked Rice-flower	An impact greater than that allowed;

The development does not improve or maintain biodiversity values and a biobanking statement cannot be issued.



Ecosystem Credits

Vegetation Type	Area (ha)	Credits Required	Red Flag
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin [ME018]	0.6	12	No
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin [ME018]	7.5	332	Yes
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin [ME020]	4.9	86	No
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin [ME020]	17.2	763	Yes
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin [ME021]	0.5	23	Yes

Credit Profiles

Group: 1 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 12 credits

Total area of vegetation(s): 0.59 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
<p>Description: Minimum surrounding vegetation cover in which the credits must be obtained.</p> <p>Minimum percent cover: 0%</p>	<p>Description: Minimum area of contiguous vegetation in which credits must be obtained.</p> <p>Minimum area: 0 ha</p>

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)

Burrigorang (Part A)

Cumberland

Wollemi

Yengo

Veg Type(s)

Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (HN526)

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (HN528)

Sydney Metro

CMA Sub-Region(s)

Cumberland

Sydney Cataract

Veg Type(s)

Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (ME018)

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (ME020)

Department of Environment & Climate Change NSW

Group: 2 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 332 credits

Total area of vegetation(s): 7.49 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 0%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 0 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)	Veg Type(s)
Burrigorang (Part A)	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (HN528)
Cumberland	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (HN528)
Wollemi	
Yengo	

Sydney Metro

CMA Sub-Region(s)	Veg Type(s)
Cumberland	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (ME018)
Sydney Cataract	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (ME020)

Group: 3 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 86 credits

Total area of vegetation(s): 4.87 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 0%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 0 ha



3. CMA subregion & vegetation types
 Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)	Veg Type(s)
Burrigorang (Part A)	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (HN528)
Cumberland	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (HN526)
Wollemi	
Yengo	

Sydney Metro

CMA Sub-Region(s)	Veg Type(s)
Cumberland	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (ME018)
Sydney Cataract	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (ME020)

Group: 4 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 763 credits

Total area of vegetation(s): 17.2 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 0%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 0 ha

3. CMA subregion & vegetation types
 Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)	Veg Type(s)
Burrigorang (Part A)	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (HN528)
Cumberland	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (HN526)
Wollemi	
Yengo	

Sydney Metro

CMA Sub-Region(s)	Veg Type(s)
Cumberland	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (ME018)
Sydney Cataract	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (ME020)



Group: 5 Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin

Ecosystem credits: 23 credits

Total area of vegetation(s): 0.53 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 0%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 0 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)

- Burrumbidgee (Part A)
- Cumberland
- Wollomoolloo
- Yengo

Veg Type(s)

Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin (HN513)
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin (HN556)
Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin (HN604)

Sydney Metro

CMA Sub-Region(s)

- Cumberland
- Sydney Cataract

Veg Type(s)

Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin (ME002)
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin (ME021)
Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin (ME041)

Species Credits

Species credits are required for 2 species.

Downy Wattle	Acacia pubescens
Number of species credits required:	19
Extent of impact:	1 individuals
Identification method:	Survey
Impact on red flag area?	No
Reason for red flag area:	

Spiked Rice-flower	Pimelea spicata
Number of species credits required:	2,500
Extent of impact:	55 individuals
Identification method:	Survey
Impact on red flag area?	Yes
Reason for red flag area:	An impact greater than that allowed;



BioBanking

Biodiversity Banking and Offsets Scheme

Biobanking Credit Report

This report identifies the number and type of credits required at a DEVELOPMENT SITE.

Date of report: 12/11/2009 Time: 14:32 Tool Version: 1.1

Development Details

Proposal ID: 1234/2009/D001
Development Name: M7 Motorway Hawkesbury-Nepean CMA
Development Location: Around Sydney
Development Address:

CMA: Hawkesbury/Nepean

Proponent Name: RTA

Proponent Address:

Proponent Phone:

Assessor Name: Meital Winter

Assessor Address: DECC 43 Bridge Street, Hurstville

Assessor Phone: 02 9585 6905

Assessor Accreditation Number: 1

The following information is required to be submitted with this BioBanking Statement (where ticked)

Local reference data is required for the following vegetation zones

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

An Expert Report for the following species

The minimum number of plots were not entered for the following vegetation zones

Department of Environment & Climate Change NSW



Improving or maintaining biodiversity values

The proposal has 1 or more Red Flag areas, as listed below:

Red Flag	Reason
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	Vegetation type being > 70% cleared; Vegetation type contains an endangered ecological community;
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Vegetation type being > 70% cleared; Vegetation type contains an endangered ecological community;
Dillwynia tenuifolia	An impact greater than that allowed;
Juniper-leaved Grevillea	An impact greater than that allowed;

The development does not improve or maintain biodiversity values and a biobanking statement cannot be issued.



Ecosystem Credits

Vegetation Type	Area (ha)	Credits Required	Red Flag
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin [HN526]	3.1	196	Yes
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin [HN526]	1.8	43	No
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin [HN526]	2.5	44	No
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin [HN528]	2.3	145	Yes
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin [HN528]	1.7	33	No
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin [HN528]	4.6	78	No
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin [HN528]	25.5	1,148	Yes

Credit Profiles

Group: 1 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 196 credits

Total area of vegetation(s): 3.12 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
<p>Description: Minimum surrounding vegetation cover in which the credits must be obtained.</p> <p>Minimum percent cover: 10%</p>	<p>Description: Minimum area of contiguous vegetation in which credits must be obtained.</p> <p>Minimum area: 100 ha</p>

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)

Cumberland

Yengo

Veg Type(s)

Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (HN526)

Group: 2 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 43 credits

Total area of vegetation(s): 1.8 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 10%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)

Cumberland

Yengo

Veg Type(s)

Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (HN526)

Group: 3 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 44 credits

Total area of vegetation(s): 2.53 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 0%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 0 ha

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)

Cumberland

Yengo

Veg Type(s)

Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (HN526)

Group: 4 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 145 credits

Total area of vegetation(s): 2.31 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 10%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)

Cumberland

Yengo

Veg Type(s)

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (HN528)

Group: 5 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 33 credits

Total area of vegetation(s): 1.74 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 10%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)

Cumberland

Yengo

Veg Type(s)

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (HN528)

Group: 6 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 78 credits

Total area of vegetation(s): 4.56 ha



1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 0%	Minimum area: 0 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)

Cumberland
Yengo

Veg Type(s)

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (HN528)

Group: 7 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Ecosystem credits: 1,148 credits

Total area of vegetation(s): 25.53 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained.	Description: Minimum area of contiguous vegetation in which credits must be obtained.
Minimum percent cover: 0%	Minimum area: 0 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Hawkesbury/Nepean

CMA Sub-Region(s)

Cumberland
Yengo

Veg Type(s)

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (HN528)

Species Credits

Species credits are required for 2 species.

Dillwynia tenuifolia	Dillwynia tenuifolia
Number of species credits required:	6,218
Extent of impact:	342 individuals
Identification method:	Survey
Impact on red flag area?	Yes
Reason for red flag area:	An impact greater than that allowed;

Juniper-leaved Grevillea

Grevillea juniperina subsp. juniperina

Number of species credits required:

35,180

Extent of impact:

1759 individuals

Identification method:

Survey

Impact on red flag area?

Yes

Reason for red flag area:

An impact greater than that allowed;



Appendix 3: Credit reports for Biobank sites

1. Rouse Hill
2. Horsley Park
3. Kemps Creek
4. Bents Basin
5. Girl Guides (Gulguer)
6. Colebee

BioBanking

Biodiversity Banking and Offsets Scheme

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 06/11/2009 Time: 14:45 Tool Version: 1.1

Property Details

Proposal ID: 2009/1234/B001
Biobank Name: M7 offset 1
Biobank Location: Rouse Hill
Biobank Address: Windsor Rd
Lot: 189 **Section:** **DP:** 201260
CMA: Hawkesbury/Nepean
Landholder Name: RTA
Landholder Address: Sydney
Landholder Phone:
Assessor Name: Tim Hager
Assessor Address: PO Box 1967 Hurstville 2220
Assessor Phone: 9585 6417
Assessor Accreditation Number: 1234

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- All or part of the biobank site is covered by a covenant, has received govt funding or is crown land
- Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
- Expert Report for the following species:
- Justification for request of additional increase in site value score with management for the following vegetation zones:
- The minimum number of plots were not entered for the following vegetation zones

Department of Environment & Climate Change NSW

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	0.35	3
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	1.76	13

Credit Profile

Group 1 : Ecosystem credits: 3 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 0.35 ha

Group 2 : Ecosystem credits: 13 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.76 ha

Species Credits

Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property



BioBanking

Biodiversity Banking and Offsets Scheme

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 06/11/2009 Time: 14:23 Tool Version: 1.1

Property Details

Proposal ID: 2009/1234/B004
Biobank Name: M7 offset4
Biobank Location: Horsley Park
Biobank Address: Horsley Drive
Lot: 91B **Section:** **DP:** 17288
CMA: Hawkesbury/Nepean
Landholder Name: RTA
Landholder Address: Sydney
Landholder Phone:
Assessor Name: Tim Hager
Assessor Address: PO Box 1967 Hurstville 2220
Assessor Phone: 9585 6417
Assessor Accreditation Number: 1234

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- All or part of the biobank site is covered by a covenant, has received govt funding or is crown land
- Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin
- Expert Report for the following species:
- Justification for request of additional increase in site value score with management for the following vegetation zones:
- The minimum number of plots were not entered for the following vegetation zones

Department of Environment & Climate Change NSW

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	0.83	6
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin	2.16	16

Credit Profile

Group 1 : Ecosystem credits: 6 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	0-10%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 0.83 ha

Group 2 : Ecosystem credits: 16 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	0-10%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 2.16 ha

Species Credits

The property is capable of creating species credits for 1 species.

Spiked Rice-flower	<i>Pimelea spicata</i>
Number of Species Credits capable of being created:	450 Credits
Area of habitat:	75 individuals

Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)	
Spiked Rice-flower	75 individuals
Nutrient Control	
Spiked Rice-flower	75 individuals

BioBanking

Biodiversity Banking and Offsets Scheme

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 06/11/2009 Time: 14:34 Tool Version: 1.1

Property Details

Proposal ID: 2009/1234/B006
Biobank Name: M7 Offset 6 Kemps Ck north
Biobank Location: Kemps Creek
Biobank Address: off Elizabeth Drive
Lot: 13 Section: DP: 106541
Lot: 14 Section: DP: 106541
CMA: Hawkesbury/Nepean
Landholder Name: RTA
Landholder Address:
Landholder Phone:
Assessor Name: Cath Gallery
Assessor Address: DECC
Assessor Phone:
Assessor Accreditation Number:

The following information is required to be submitted with this BioBanking Agreement (where ticked)

All or part of the biobank site is covered by a covenant, has received govt funding or is crown land

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Expert Report for the following species:

Justification for request of additional increase in site value score with management for the following vegetation zones:

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

The minimum number of plots were not entered for the following vegetation zones

Department of Environment & Climate Change NSW

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	1.16	5
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	12.03	89
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	0.39	2
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	0.82	6

Credit Profile

Group 1 : Ecosystem credits: 5 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 1.16 ha

Group 2 : Ecosystem credits: 89 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 12.03 ha

Group 3 : Ecosystem credits: 2 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 0.39 ha

Group 4 : Ecosystem credits: 6 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

Surrounding vegetation cover class	11-30%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 0.82 ha

Species Credits

The property is capable of creating species credits for 1 species.

Downy Wattle	<i>Acacia pubescens</i>
Number of Species Credits capable of being created:	60 Credits
Area of habitat:	10 individuals

Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

BioBanking

Biodiversity Banking and Offsets Scheme

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 06/11/2009 Time: 14:44 Tool Version: 1.1

Property Details

Proposal ID: 2009/1234/B007

Biobank Name: Bents Basin Addition

Biobank Location:

Biobank Address:

CMA: Hawkesbury/Nepean

Landholder Name:

Landholder Address:

Landholder Phone:

Assessor Name:

Assessor Address:

Assessor Phone:

Assessor Accreditation Number:

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- All or part of the biobank site is covered by a covenant, has received govt funding or is crown land

Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin
Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest in sandstone gullies of western Sydney, Sydney Basin

- Expert Report for the following species:
 Justification for request of additional increase in site value score with management for the following vegetation zones:
 The minimum number of plots were not entered for the following vegetation zones

Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin	12.94	83
Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest in sandstone gullies of western Sydney, Sydney Basin	4.7	35

Credit Profile

Group 1 : Ecosystem credits: 83 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 12.94 ha

Group 2 : Ecosystem credits: 35 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest in sandstone gullies of western Sydney, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 4.7 ha



Species Credits

The property is capable of creating species credits for 1 species.

Square-tailed Kite	<i>Lophoictinia isura</i>
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Number of Species Credits capable of being created:	102 Credits
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Area of habitat:	17 ha
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Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

BioBanking

Biodiversity Banking and Offsets Scheme

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 06/11/2009 Time: 14:32 Tool Version: 1.1

Property Details

Proposal ID: 2009/1234/B005

Biobank Name: M7 Offset 5 Girl Guides

Biobank Location: adjacent Gulguer Nature Reserve

Biobank Address: cnr Taylors and Eltons Rds, Silverdale

Lot: 22	Section:	DP: 594195
Lot: 831	Section:	DP: 810005
Lot: 1	Section:	DP: 530284

CMA: Hawkesbury/Nepean

Landholder Name: RTA

Landholder Address:

Landholder Phone:

Assessor Name: Cath Gallery

Assessor Address: DECC

Assessor Phone:

Assessor Accreditation Number:

The following information is required to be submitted with this BioBanking Agreement (where ticked)

- All or part of the biobank site is covered by a covenant, has received govt funding or is crown land

Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin

Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin

Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin

Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin

Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin

Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin

- Expert Report for the following species:

-
- Justification for request of additional increase in site value score with management for the following vegetation zones:
 - The minimum number of plots were not entered for the following vegetation zones



Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin	10.3	66
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin	10.4	93
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin	2.5	28
Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin	0.7	6
Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin	16.6	117
Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin	0.5	6

Credit Profile

Group 1 : Ecosystem credits: 66 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 10.3 ha

Group 2 : Ecosystem credits: 93 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 10.4 ha

Group 3 : Ecosystem credits: 28 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Narrow-leaved Ironbark - Broad-leaved

Department of Environment & Climate Change NSW



	Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 2.5 ha

Group 4 : Ecosystem credits: 6 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 0.7 ha

Group 5 : Ecosystem credits: 117 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	>100 ha

Total area of Vegetation zone(s) included in this group: 16.6 ha

Group 6 : Ecosystem credits: 6 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	31-70%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 0.5 ha

Species Credits

The property is capable of creating species credits for 1 species.

Square-tailed Kite	<i>Lophoictinia isura</i>
Number of Species Credits capable of being created:	180 Credits
Area of habitat:	30 ha

Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

BioBanking

Biodiversity Banking and Offsets Scheme

Biobanking Agreement Credit Report

This report identifies the number and type of credits that may be created at a BIOBANK SITE.

Date of report: 06/11/2009 Time: 14:21 Tool Version: 1.1

Property Details

Proposal ID: 2009/1234/B002
Biobank Name: M7 offset2
Biobank Location: Colbee
Biobank Address: Richmond Rd
Lot: 41 Section: DP: 110085
Lot: 42 Section: DP: 110085
CMA: Hawkesbury/Nepean
Landholder Name: RTA
Landholder Address: Sydney
Landholder Phone:
Assessor Name: Tim Hager
Assessor Address: PO Box 1967 Hurstville 2220
Assessor Phone: 9585 64 17
Assessor Accreditation Number: 1234

The following information is required to be submitted with this BioBanking Agreement (where ticked)

All or part of the biobank site is covered by a covenant, has received govt funding or is crown land

- Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin
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- Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin
- Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
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Sydney Basin

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain,
Sydney Basin

Expert Report for the following species:

Justification for request of additional increase in site value score with management for the following vegetation zones:

Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the
Cumberland Plain, Sydney Basin

Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

The minimum number of plots were not entered for the following vegetation zones

Department of Environment & Climate Change NSW



Ecosystem Credits

Vegetation Type	Area (ha)	Credits created
Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin	3.45	25
Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin	16.96	132
Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin	5.53	48
Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin	0.38	3
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	1.33	11
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	2.66	17
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	19.58	152
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	2.21	26
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	2.47	26

Credit Profile

Group 1 : Ecosystem credits: 25 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 3.45 ha

Group 2 : Ecosystem credits: 132 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	25 - 100 ha

Total area of Vegetation zone(s) included in this group: 16.96 ha

Group 3 : Ecosystem credits: 48 credits

Department of Environment & Climate Change NSW

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	25 - 100 ha

Total area of Vegetation zone(s) included in this group: 5.53 ha

Group 4 : Ecosystem credits: 3 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	25 - 100 ha

Total area of Vegetation zone(s) included in this group: 0.98 ha

Group 5 : Ecosystem credits: 11 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 1.93 ha

Group 6 : Ecosystem credits: 17 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	0 - 5 ha

Total area of Vegetation zone(s) included in this group: 2.66 ha

Group 7 : Ecosystem credits: 152 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	25 - 100 ha

Total area of Vegetation zone(s) included in this group: 19.58 ha

Group 8 : Ecosystem credits: 26 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	25 - 100 ha

Total area of Vegetation zone(s) included in this group: 2.21 ha

Group 9 : Ecosystem credits: 26 credits

CMA	Hawkesbury/Nepean
CMA Sub-region	Cumberland (88)
Vegetation type	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
Surrounding vegetation cover class	11-30%
Patch size, including low condition	25 - 100 ha

Total area of Vegetation zone(s) included in this group: 2.47 ha



Species Credits

The property is capable of creating species credits for 3 species.

Dillwynia tenuifolia	<i>Dillwynia tenuifolia</i>
Number of Species Credits capable of being created:	15,000 Credits
Area of habitat:	2500 individuals
Juniper-leaved Grevillea	<i>Grevillea juniperina subsp. juniperina</i>
Number of Species Credits capable of being created:	30,000 Credits
Area of habitat:	5000 individuals
Pultenaea parviflora	<i>Pultenaea parviflora</i>
Number of Species Credits capable of being created:	15,000 Credits
Area of habitat:	2500 individuals

Additional Management Actions

The following management actions are required at the property. These actions are in addition to the standard management actions required at the property

Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)	
Pultenaea parviflora	2500 individuals
Juniper-leaved Grevillea	5000 individuals
Dillwynia tenuifolia	2500 individuals
Nutrient Control	
Pultenaea parviflora	2500 individuals

Appendix 4: In perpetuity costs of management for each offset site

This appendix has been provided as an Excel spreadsheet for each property.

1. Rouse Hill
2. Horsley Park
3. Kemps Creek
4. Bents Basin
5. Girl Guides (Gulguer)
6. Colebee

Credit pricing worksheet

S I T E	Biobank site description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	2	2	2	2	2
	No. of biodiversity credits issued	16	16	16	16	16

P A R T B	Costs to enter into a biobanking agreement	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Site assessment and Biobanking Agreement Credit Report preparation	\$8,860	\$8,860	\$8,860	\$8,860	\$8,860
	Preparation of management actions	\$7,100	\$7,100	\$7,100	\$7,100	\$7,100
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$4,780	\$4,780	\$4,780	\$4,780	\$4,780
	Total cost to enter into a biobanking agreement (excluding interest)	\$23,852	\$23,852	\$23,852	\$23,852	\$23,852
	Loan amount for setup of biobank	\$24,000	\$24,000	\$24,000	\$24,000	\$24,000
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
	Loan period in years	2	2	2	2	2
	Interest on setup cost	\$3,478	\$3,478	\$3,478	\$3,478	\$3,478
	Total cost to enter into a biobanking agreement (including interest incurred)	\$27,330	\$27,330	\$27,330	\$27,330	\$27,330
	Opportunity cost to landowner (optional)	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Market value of land (\$ per ha)	\$0	\$250,000	\$500,000	\$750,000	\$1,000,000
	Total market value of land (\$ per ha x area)	\$0	\$500,000	\$1,000,000	\$1,500,000	\$2,000,000
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$500,000	\$1,000,000	\$1,500,000	\$2,000,000	

P A R T A	Total Fund Deposit	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$400,000	\$400,000	\$400,000	\$400,000	\$400,000

From previous worksheet
\$401,547

T O T A L	Total costs	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$400,000	\$400,000	\$400,000	\$400,000	\$400,000
	Total cost to enter into a biobanking agreement	\$27,330	\$27,330	\$27,330	\$27,330	\$27,330
	Total opportunity cost to landowner	\$0	\$500,000	\$1,000,000	\$1,500,000	\$2,000,000
	Total cost	\$427,330	\$927,330	\$1,427,330	\$1,927,330	\$2,427,330
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000
Desired total price of credits (including profit or risk margin)	\$507,330	\$1,007,330	\$1,507,330	\$2,007,330	\$2,507,330	

C R E D I T P R I C E	Potential credit price	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Trust Fund Deposit amount per credit	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
	Cost to enter into a biobanking agreement per credit	\$1,708	\$1,708	\$1,708	\$1,708	\$1,708
	Opportunity cost to landholder per credit	\$0	\$31,250	\$62,500	\$93,750	\$125,000
	Profit margin per credit	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Individual credit price (total price / number of credits)	\$31,708	\$62,958	\$94,208	\$125,458	\$156,708
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$507,330	\$1,007,330	\$1,507,330	\$2,007,330	\$2,507,330
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$31,708	\$62,958	\$94,208	\$125,458	\$156,708
	Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	

Total Fund Deposit worksheet (Part A costs)

This template should be used for estimating the Total Fund Deposit and preparation of the payment schedule

Biobank site location	Horsley Park
Biobank site owner	NSW Roads and Traffic Authority
Are you registered for GST/do you have an ABN?	Yes
ABN	
(OFFICE USE ONLY: BIMS REFERENCE NUMBER)	
(OFFICE USE ONLY: SAP BTF WBS)	

Add row for management action cost

Add row for other recurring cost

Real discount rate
3.50%

Management action costs	Timing			Estimated annual cost (\$)	Year																				Present value of payments for first 20 yrs	Present value of payments after 20 yrs	Present value of all payments	
	Start year	End year	Frequency		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
ESTABLISHMENT COSTS																												
Fencing External (50% split with neighbour) (134m @ \$12.5/m)	1	1	1	1,675	1,675	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,675	0	1,675
Fencing Internal (100% Stock proof 125m @ \$12.5/m)	1	1	1	1,563	1,563	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,563	0	1,563
Rubbish removal (initial if applicable)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Land Decontamination (if applicable) Removal of fill	1	1	1	8,500	8,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,500	0	8,500
Management Trail establishment				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fire Break establishment				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
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				0	0	0																						

Credit pricing worksheet

S I T E	Biobank site description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	3	3	3	3	3
	No. of biodiversity credits issued	22	22	22	22	22

P A R T B	Costs to enter into a biobanking agreement	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Site assessment and Biobanking Agreement Credit Report preparation	\$8,860	\$8,860	\$8,860	\$8,860	\$8,860
	Preparation of management actions	\$7,110	\$7,110	\$7,110	\$7,110	\$7,110
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$4,780	\$4,780	\$4,780	\$4,780	\$4,780
	Total cost to enter into a biobanking agreement (excluding interest)	\$23,862	\$23,862	\$23,862	\$23,862	\$23,862
	Loan amount for setup of biobank	\$24,000	\$24,000	\$24,000	\$24,000	\$24,000
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
	Loan period in years	2	2	2	2	2
	Interest on setup cost	\$3,478	\$3,478	\$3,478	\$3,478	\$3,478
	Total cost to enter into a biobanking agreement (including interest incurred)	\$27,340	\$27,340	\$27,340	\$27,340	\$27,340
	Opportunity cost to landowner (optional)	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Market value of land (\$ per ha)	\$0	\$112,500	\$225,000	\$337,500	\$450,000
	Total market value of land (\$ per ha x area)	\$0	\$337,500	\$675,000	\$1,012,500	\$1,350,000
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$337,500	\$675,000	\$1,012,500	\$1,350,000	

P A R T A	Total Fund Deposit	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$447,319	\$447,319	\$447,319	\$447,319	\$447,319

From previous worksheet
\$447,319

T O T A L	Total costs	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$447,319	\$447,319	\$447,319	\$447,319	\$447,319
	Total cost to enter into a biobanking agreement	\$27,340	\$27,340	\$27,340	\$27,340	\$27,340
	Total opportunity cost to landowner	\$0	\$337,500	\$675,000	\$1,012,500	\$1,350,000
	Total cost	\$474,659	\$812,159	\$1,149,659	\$1,487,159	\$1,824,659
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$89,464	\$89,464	\$89,464	\$89,464	\$89,464
Desired total price of credits (including profit or risk margin)	\$564,122	\$901,622	\$1,239,122	\$1,576,622	\$1,914,122	

C R E D I T P R I C E	Potential credit price	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Trust Fund Deposit amount per credit	\$20,333	\$20,333	\$20,333	\$20,333	\$20,333
	Cost to enter into a biobanking agreement per credit	\$1,243	\$1,243	\$1,243	\$1,243	\$1,243
	Opportunity cost to landholder per credit	\$0	\$15,341	\$30,682	\$46,023	\$61,364
	Profit margin per credit	\$4,067	\$4,067	\$4,067	\$4,067	\$4,067
	Individual credit price (total price / number of credits)	\$25,642	\$40,983	\$56,324	\$71,665	\$87,006
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$564,122	\$901,622	\$1,239,122	\$1,576,622	\$1,914,122
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$25,642	\$40,983	\$56,324	\$71,665	\$87,006
	Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$16,266	\$16,266	\$16,266	\$16,266	\$16,266
Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$20,333	\$20,333	\$20,333	\$20,333	\$20,333	

Credit pricing worksheet

SITE	Biobank site description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	3	3	3	3	3
	No. of biodiversity credits issued	22	22	22	22	22

PART B	Costs to enter into a biobanking agreement	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Site assessment and Biobanking Agreement Credit Report preparation	\$8,860	\$8,860	\$8,860	\$8,860	\$8,860
	Preparation of management actions	\$7,110	\$7,110	\$7,110	\$7,110	\$7,110
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$4,780	\$4,780	\$4,780	\$4,780	\$4,780
	Total cost to enter into a biobanking agreement (excluding interest)	\$23,862	\$23,862	\$23,862	\$23,862	\$23,862
	Loan amount for setup of biobank	\$24,000	\$24,000	\$24,000	\$24,000	\$24,000
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
	Loan period in years	2	2	2	2	2
	Interest on setup cost	\$3,478	\$3,478	\$3,478	\$3,478	\$3,478
	Total cost to enter into a biobanking agreement (including interest incurred)	\$27,340	\$27,340	\$27,340	\$27,340	\$27,340
	Opportunity cost to landowner (optional)	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Market value of land (\$ per ha)	\$0	\$112,500	\$225,000	\$337,500	\$450,000
	Total market value of land (\$ per ha x area)	\$0	\$337,500	\$675,000	\$1,012,500	\$1,350,000
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$337,500	\$675,000	\$1,012,500	\$1,350,000	

PART A	Total Fund Deposit	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$402,319	\$402,319	\$402,319	\$402,319	\$402,319

From previous worksheet
\$447,319
\$402,319

TOTAL	Total costs	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$402,319	\$402,319	\$402,319	\$402,319	\$402,319
	Total cost to enter into a biobanking agreement	\$27,340	\$27,340	\$27,340	\$27,340	\$27,340
	Total opportunity cost to landowner	\$0	\$337,500	\$675,000	\$1,012,500	\$1,350,000
	Total cost	\$429,659	\$767,159	\$1,104,659	\$1,442,159	\$1,779,659
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$80,464	\$80,464	\$80,464	\$80,464	\$80,464
Desired total price of credits (including profit or risk margin)	\$510,122	\$847,622	\$1,185,122	\$1,522,622	\$1,860,122	

CREDIT PRICE	Potential credit price	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Trust Fund Deposit amount per credit	\$18,287	\$18,287	\$18,287	\$18,287	\$18,287
	Cost to enter into a biobanking agreement per credit	\$1,243	\$1,243	\$1,243	\$1,243	\$1,243
	Opportunity cost to landholder per credit	\$0	\$15,341	\$30,682	\$46,023	\$61,364
	Profit margin per credit	\$3,657	\$3,657	\$3,657	\$3,657	\$3,657
	Individual credit price (total price / number of credits)	\$23,187	\$38,528	\$53,869	\$69,210	\$84,551
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$510,122	\$847,622	\$1,185,122	\$1,522,622	\$1,860,122
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$23,187	\$38,528	\$53,869	\$69,210	\$84,551
	Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$14,630	\$14,630	\$14,630	\$14,630	\$14,630
Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$18,287	\$18,287	\$18,287	\$18,287	\$18,287	

Credit pricing worksheet

S I T E	Biobank site description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	14	14	14	14	14
	No. of biodiversity credits issued	102	102	102	102	102

P A R T B	Costs to enter into a biobanking agreement	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Site assessment and Biobanking Agreement Credit Report preparation	\$12,100	\$12,100	\$12,100	\$12,100	\$12,100
	Preparation of management actions	\$8,300	\$8,300	\$8,300	\$8,300	\$8,300
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$5,400	\$5,400	\$5,400	\$5,400	\$5,400
	Total cost to enter into a biobanking agreement (excluding interest)	\$28,912	\$28,912	\$28,912	\$28,912	\$28,912
	Loan amount for setup of biobank	\$29,000	\$29,000	\$29,000	\$29,000	\$29,000
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
	Loan period in years	2	2	2	2	2
	Interest on setup cost	\$4,202	\$4,202	\$4,202	\$4,202	\$4,202
	Total cost to enter into a biobanking agreement (including interest incurred)	\$33,114	\$33,114	\$33,114	\$33,114	\$33,114
	Opportunity cost to landowner (optional)	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Market value of land (\$ per ha)	\$0	\$43,750	\$87,500	\$131,250	\$175,000
	Total market value of land (\$ per ha x area)	\$0	\$612,500	\$1,225,000	\$1,837,500	\$2,450,000
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$612,500	\$1,225,000	\$1,837,500	\$2,450,000	

P A R T A	Total Fund Deposit	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$700,000	\$700,000	\$700,000	\$700,000	\$700,000

From previous worksheet
\$699,253

T O T A L	Total costs	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$700,000	\$700,000	\$700,000	\$700,000	\$700,000
	Total cost to enter into a biobanking agreement	\$33,114	\$33,114	\$33,114	\$33,114	\$33,114
	Total opportunity cost to landowner	\$0	\$612,500	\$1,225,000	\$1,837,500	\$2,450,000
	Total cost	\$733,114	\$1,345,614	\$1,958,114	\$2,570,614	\$3,183,114
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$140,000	\$140,000	\$140,000	\$140,000	\$140,000
Desired total price of credits (including profit or risk margin)	\$873,114	\$1,485,614	\$2,098,114	\$2,710,614	\$3,323,114	

C R E D I T P R I C E	Potential credit price	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Trust Fund Deposit amount per credit	\$6,863	\$6,863	\$6,863	\$6,863	\$6,863
	Cost to enter into a biobanking agreement per credit	\$325	\$325	\$325	\$325	\$325
	Opportunity cost to landholder per credit	\$0	\$6,005	\$12,010	\$18,015	\$24,020
	Profit margin per credit	\$1,373	\$1,373	\$1,373	\$1,373	\$1,373
	Individual credit price (total price / number of credits)	\$8,560	\$14,565	\$20,570	\$26,575	\$32,580
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$873,114	\$1,485,614	\$2,098,114	\$2,710,614	\$3,323,114
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$8,560	\$14,565	\$20,570	\$26,575	\$32,580
	Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$5,490	\$5,490	\$5,490	\$5,490	\$5,490
Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$6,863	\$6,863	\$6,863	\$6,863	\$6,863	

Credit pricing worksheet

SITE	Biobank site description				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	14	14	14	14
No. of biodiversity credits issued	102	102	102	102	102

PART B	Costs to enter into a biobanking agreement					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Site assessment and Biobanking Agreement Credit Report preparation	\$12,100	\$12,100	\$12,100	\$12,100	\$12,100
	Preparation of management actions	\$8,300	\$8,300	\$8,300	\$8,300	\$8,300
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$5,400	\$5,400	\$5,400	\$5,400	\$5,400
	Total cost to enter into a biobanking agreement (excluding interest)	\$28,912	\$28,912	\$28,912	\$28,912	\$28,912
	Loan amount for setup of biobank	\$29,000	\$29,000	\$29,000	\$29,000	\$29,000
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
	Loan period in years	2	2	2	2	2
	Interest on setup cost	\$4,202	\$4,202	\$4,202	\$4,202	\$4,202
	Total cost to enter into a biobanking agreement (including interest incurred)	\$33,114	\$33,114	\$33,114	\$33,114	\$33,114
	Opportunity cost to landowner (optional)					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
Market value of land (\$ per ha)	\$0	\$43,750	\$87,500	\$131,250	\$175,000	
Total market value of land (\$ per ha x area)	\$0	\$612,500	\$1,225,000	\$1,837,500	\$2,450,000	
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$612,500	\$1,225,000	\$1,837,500	\$2,450,000	

PART A	Total Fund Deposit				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Total Fund Deposit	\$696,253	\$696,253	\$696,253	\$696,253	\$696,253

From previous worksheet
\$699,253
\$696,253

TOTAL	Total costs					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Total Fund Deposit	\$696,253	\$696,253	\$696,253	\$696,253	\$696,253
	Total cost to enter into a biobanking agreement	\$33,114	\$33,114	\$33,114	\$33,114	\$33,114
	Total opportunity cost to landowner	\$0	\$612,500	\$1,225,000	\$1,837,500	\$2,450,000
	Total cost	\$729,367	\$1,341,867	\$1,954,367	\$2,566,867	\$3,179,367
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$139,251	\$139,251	\$139,251	\$139,251	\$139,251
Desired total price of credits (including profit or risk margin)	\$868,618	\$1,481,118	\$2,093,618	\$2,706,118	\$3,318,618	

CREDIT	Potential credit price					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Trust Fund Deposit amount per credit	\$6,826	\$6,826	\$6,826	\$6,826	\$6,826
	Cost to enter into a biobanking agreement per credit	\$325	\$325	\$325	\$325	\$325
	Opportunity cost to landholder per credit	\$0	\$6,005	\$12,010	\$18,015	\$24,020
	Profit margin per credit	\$1,365	\$1,365	\$1,365	\$1,365	\$1,365
	Individual credit price (total price / number of credits)	\$8,516	\$14,521	\$20,526	\$26,531	\$32,535
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$868,618	\$1,481,118	\$2,093,618	\$2,706,118	\$3,318,618
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$8,516	\$14,521	\$20,526	\$26,531	\$32,535
	Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$5,461	\$5,461	\$5,461	\$5,461	\$5,461
	Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$6,826	\$6,826	\$6,826	\$6,826	\$6,826

Credit pricing worksheet

S I T E	Biobank site description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	18	18	18	18	18
	No. of biodiversity credits issued	118	118	118	118	118

P A R T B	Costs to enter into a biobanking agreement	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Site assessment and Biobanking Agreement Credit Report preparation	\$23,220	\$23,220	\$23,220	\$23,220	\$23,220
	Preparation of management actions	\$11,250	\$11,250	\$11,250	\$11,250	\$11,250
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$5,400	\$5,400	\$5,400	\$5,400	\$5,400
	Total cost to enter into a biobanking agreement (excluding interest)	\$42,982	\$42,982	\$42,982	\$42,982	\$42,982
	Loan amount for setup of biobank	\$43,000	\$43,000	\$43,000	\$43,000	\$43,000
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
	Loan period in years	2	2	2	2	2
	Interest on setup cost	\$6,231	\$6,231	\$6,231	\$6,231	\$6,231
	Total cost to enter into a biobanking agreement (including interest incurred)	\$49,213	\$49,213	\$49,213	\$49,213	\$49,213
	Opportunity cost to landowner (optional)	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Market value of land (\$ per ha)	\$0	\$2,905	\$5,810	\$8,715	\$11,620
	Total market value of land (\$ per ha x area)	\$0	\$52,290	\$104,580	\$156,870	\$209,160
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$52,290	\$104,580	\$156,870	\$209,160	

P A R T A	Total Fund Deposit	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$1,189,259	\$1,189,259	\$1,189,259	\$1,189,259	\$1,189,259

From previous worksheet
\$1,189,259

T O T A L	Total costs	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$1,189,259	\$1,189,259	\$1,189,259	\$1,189,259	\$1,189,259
	Total cost to enter into a biobanking agreement	\$49,213	\$49,213	\$49,213	\$49,213	\$49,213
	Total opportunity cost to landowner	\$0	\$52,290	\$104,580	\$156,870	\$209,160
	Total cost	\$1,238,472	\$1,290,762	\$1,343,052	\$1,395,342	\$1,447,632
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$237,852	\$237,852	\$237,852	\$237,852	\$237,852
Desired total price of credits (including profit or risk margin)	\$1,476,324	\$1,528,614	\$1,580,904	\$1,633,194	\$1,685,484	

C R E D I T P R I C E	Potential credit price	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Trust Fund Deposit amount per credit	\$10,078	\$10,078	\$10,078	\$10,078	\$10,078
	Cost to enter into a biobanking agreement per credit	\$417	\$417	\$417	\$417	\$417
	Opportunity cost to landholder per credit	\$0	\$443	\$886	\$1,329	\$1,773
	Profit margin per credit	\$2,016	\$2,016	\$2,016	\$2,016	\$2,016
	Individual credit price (total price / number of credits)	\$12,511	\$12,954	\$13,397	\$13,841	\$14,284
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$1,476,324	\$1,528,614	\$1,580,904	\$1,633,194	\$1,685,484
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$12,511	\$12,954	\$13,397	\$13,841	\$14,284
	Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$8,063	\$8,063	\$8,063	\$8,063	\$8,063
Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$10,078	\$10,078	\$10,078	\$10,078	\$10,078	

Credit pricing worksheet

SITE	Biobank site description				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	18	18	18	18
No. of biodiversity credits issued	118	118	118	118	118

PART B	Costs to enter into a biobanking agreement					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Site assessment and Biobanking Agreement Credit Report preparation	\$23,220	\$23,220	\$23,220	\$23,220	\$23,220
	Preparation of management actions	\$11,250	\$11,250	\$11,250	\$11,250	\$11,250
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$5,400	\$5,400	\$5,400	\$5,400	\$5,400
	Total cost to enter into a biobanking agreement (excluding interest)	\$42,982	\$42,982	\$42,982	\$42,982	\$42,982
	Loan amount for setup of biobank	\$43,000	\$43,000	\$43,000	\$43,000	\$43,000
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
	Loan period in years	2	2	2	2	2
	Interest on setup cost	\$6,231	\$6,231	\$6,231	\$6,231	\$6,231
	Total cost to enter into a biobanking agreement (including interest incurred)	\$49,213	\$49,213	\$49,213	\$49,213	\$49,213
	Opportunity cost to landowner (optional)					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
Market value of land (\$ per ha)	\$0	\$2,905	\$5,810	\$8,715	\$11,620	
Total market value of land (\$ per ha x area)	\$0	\$52,290	\$104,580	\$156,870	\$209,160	
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$52,290	\$104,580	\$156,870	\$209,160	

PART A	Total Fund Deposit				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Total Fund Deposit	\$1,188,239	\$1,188,239	\$1,188,239	\$1,188,239	\$1,188,239

From previous worksheet
\$1,189,259
\$1,188,239

TOTAL	Total costs					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Total Fund Deposit	\$1,188,239	\$1,188,239	\$1,188,239	\$1,188,239	\$1,188,239
	Total cost to enter into a biobanking agreement	\$49,213	\$49,213	\$49,213	\$49,213	\$49,213
	Total opportunity cost to landowner	\$0	\$52,290	\$104,580	\$156,870	\$209,160
	Total cost	\$1,237,452	\$1,289,742	\$1,342,032	\$1,394,322	\$1,446,612
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$237,648	\$237,648	\$237,648	\$237,648	\$237,648
Desired total price of credits (including profit or risk margin)	\$1,475,100	\$1,527,390	\$1,579,680	\$1,631,970	\$1,684,260	

CREDIT PRICE	Potential credit price					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Trust Fund Deposit amount per credit	\$10,070	\$10,070	\$10,070	\$10,070	\$10,070
	Cost to enter into a biobanking agreement per credit	\$417	\$417	\$417	\$417	\$417
	Opportunity cost to landholder per credit	\$0	\$443	\$886	\$1,329	\$1,773
	Profit margin per credit	\$2,014	\$2,014	\$2,014	\$2,014	\$2,014
	Individual credit price (total price / number of credits)	\$12,501	\$12,944	\$13,387	\$13,830	\$14,273
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$1,475,100	\$1,527,390	\$1,579,680	\$1,631,970	\$1,684,260
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$12,501	\$12,944	\$13,387	\$13,830	\$14,273
	Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$8,056	\$8,056	\$8,056	\$8,056	\$8,056
	Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$10,070	\$10,070	\$10,070	\$10,070	\$10,070

Credit pricing worksheet

S I T E	Biobank site description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	41	41	41	41	41
	No. of biodiversity credits issued	316	316	316	316	316

P A R T B	Costs to enter into a biobanking agreement	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Site assessment and Biobanking Agreement Credit Report preparation	\$23,220	\$23,220	\$23,220	\$23,220	\$23,220
	Preparation of management actions	\$11,250	\$11,250	\$11,250	\$11,250	\$11,250
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$5,400	\$5,400	\$5,400	\$5,400	\$5,400
	Total cost to enter into a biobanking agreement (excluding interest)	\$42,982	\$42,982	\$42,982	\$42,982	\$42,982
	Loan amount for setup of biobank	\$43,000	\$43,000	\$43,000	\$43,000	\$43,000
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
	Loan period in years	2	2	2	2	2
	Interest on setup cost	\$6,231	\$6,231	\$6,231	\$6,231	\$6,231
	Total cost to enter into a biobanking agreement (including interest incurred)	\$49,213	\$49,213	\$49,213	\$49,213	\$49,213
	Opportunity cost to landowner (optional)	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Market value of land (\$ per ha)	\$0	\$4,375	\$8,750	\$13,125	\$17,500
	Total market value of land (\$ per ha x area)	\$0	\$179,375	\$358,750	\$538,125	\$717,500
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$179,375	\$358,750	\$538,125	\$717,500	

P A R T A	Total Fund Deposit	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$1,056,037	\$1,056,037	\$1,056,037	\$1,056,037	\$1,056,037

From previous worksheet
\$1,056,037

T O T A L	Total costs	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$1,056,037	\$1,056,037	\$1,056,037	\$1,056,037	\$1,056,037
	Total cost to enter into a biobanking agreement	\$49,213	\$49,213	\$49,213	\$49,213	\$49,213
	Total opportunity cost to landowner	\$0	\$179,375	\$358,750	\$538,125	\$717,500
	Total cost	\$1,105,250	\$1,284,625	\$1,464,000	\$1,643,375	\$1,822,750
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$211,207	\$211,207	\$211,207	\$211,207	\$211,207
Desired total price of credits (including profit or risk margin)	\$1,316,457	\$1,495,832	\$1,675,207	\$1,854,582	\$2,033,957	

C R E D I T P R I C E	Potential credit price	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Trust Fund Deposit amount per credit	\$3,342	\$3,342	\$3,342	\$3,342	\$3,342
	Cost to enter into a biobanking agreement per credit	\$156	\$156	\$156	\$156	\$156
	Opportunity cost to landholder per credit	\$0	\$568	\$1,135	\$1,703	\$2,271
	Profit margin per credit	\$668	\$668	\$668	\$668	\$668
	Individual credit price (total price / number of credits)	\$4,166	\$4,734	\$5,301	\$5,869	\$6,437
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$1,316,457	\$1,495,832	\$1,675,207	\$1,854,582	\$2,033,957
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$4,166	\$4,734	\$5,301	\$5,869	\$6,437
	Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$2,674	\$2,674	\$2,674	\$2,674	\$2,674
Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$3,342	\$3,342	\$3,342	\$3,342	\$3,342	

Credit pricing worksheet

SITE	Biobank site description				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	41	41	41	41
No. of biodiversity credits issued	316	316	316	316	316

PART B	Costs to enter into a biobanking agreement					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Site assessment and Biobanking Agreement Credit Report preparation	\$23,220	\$23,220	\$23,220	\$23,220	\$23,220
	Preparation of management actions	\$11,250	\$11,250	\$11,250	\$11,250	\$11,250
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$5,400	\$5,400	\$5,400	\$5,400	\$5,400
	Total cost to enter into a biobanking agreement (excluding interest)	\$42,982	\$42,982	\$42,982	\$42,982	\$42,982
	Loan amount for setup of biobank	\$43,000	\$43,000	\$43,000	\$43,000	\$43,000
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
	Loan period in years	2	2	2	2	2
	Interest on setup cost	\$6,231	\$6,231	\$6,231	\$6,231	\$6,231
	Total cost to enter into a biobanking agreement (including interest incurred)	\$49,213	\$49,213	\$49,213	\$49,213	\$49,213
	Opportunity cost to landowner (optional)					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
Market value of land (\$ per ha)	\$0	\$4,375	\$8,750	\$13,125	\$17,500	
Total market value of land (\$ per ha x area)	\$0	\$179,375	\$358,750	\$538,125	\$717,500	
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$179,375	\$358,750	\$538,125	\$717,500	

PART A	Total Fund Deposit				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Total Fund Deposit	\$1,054,237	\$1,054,237	\$1,054,237	\$1,054,237	\$1,054,237

From previous worksheet
\$1,056,037
\$1,054,237

TOTAL	Total costs					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Total Fund Deposit	\$1,054,237	\$1,054,237	\$1,054,237	\$1,054,237	\$1,054,237
	Total cost to enter into a biobanking agreement	\$49,213	\$49,213	\$49,213	\$49,213	\$49,213
	Total opportunity cost to landowner	\$0	\$179,375	\$358,750	\$538,125	\$717,500
	Total cost	\$1,103,450	\$1,282,825	\$1,462,200	\$1,641,575	\$1,820,950
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$210,847	\$210,847	\$210,847	\$210,847	\$210,847
Desired total price of credits (including profit or risk margin)	\$1,314,297	\$1,493,672	\$1,673,047	\$1,852,422	\$2,031,797	

CREDIT	Potential credit price					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Trust Fund Deposit amount per credit	\$3,336	\$3,336	\$3,336	\$3,336	\$3,336
	Cost to enter into a biobanking agreement per credit	\$156	\$156	\$156	\$156	\$156
	Opportunity cost to landholder per credit	\$0	\$568	\$1,135	\$1,703	\$2,271
	Profit margin per credit	\$667	\$667	\$667	\$667	\$667
	Individual credit price (total price / number of credits)	\$4,159	\$4,727	\$5,294	\$5,862	\$6,430
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$1,314,297	\$1,493,672	\$1,673,047	\$1,852,422	\$2,031,797
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$4,159	\$4,727	\$5,294	\$5,862	\$6,430
Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$2,669	\$2,669	\$2,669	\$2,669	\$2,669	
Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$3,336	\$3,336	\$3,336	\$3,336	\$3,336	

Credit pricing worksheet

S I T E	Biobank site description				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	55	55	55	55
No. of biodiversity credits issued	440	440	440	440	440

P A R T B	Costs to enter into a biobanking agreement					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Site assessment and Biobanking Agreement Credit Report preparation	\$22,250	\$22,250	\$22,250	\$22,250	\$22,250
	Preparation of management actions	\$11,250	\$11,250	\$11,250	\$11,250	\$11,250
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$5,400	\$5,400	\$5,400	\$5,400	\$5,400
	Total cost to enter into a biobanking agreement (excluding interest)	\$42,012	\$42,012	\$42,012	\$42,012	\$42,012
	Loan amount for setup of biobank	\$42,500	\$42,500	\$42,500	\$42,500	\$42,500
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
Loan period in years	2	2	2	2	2	
Interest on setup cost	\$6,158	\$6,158	\$6,158	\$6,158	\$6,158	
Total cost to enter into a biobanking agreement (including interest incurred)	\$48,170	\$48,170	\$48,170	\$48,170	\$48,170	
Opportunity cost to landowner (optional)						
Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5		
Market value of land (\$ per ha)	\$0	\$36,250	\$72,250	\$108,750	\$145,000	
Total market value of land (\$ per ha x area)	\$0	\$1,993,750	\$3,973,750	\$5,981,250	\$7,975,000	
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$1,993,750	\$3,973,750	\$5,981,250	\$7,975,000	

P A R T A	Total Fund Deposit				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Total Fund Deposit	\$2,375,000	\$2,375,000	\$2,375,000	\$2,375,000	\$2,375,000

From previous worksheet
\$2,372,626

T O T A L	Total costs					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Total Fund Deposit	\$2,375,000	\$2,375,000	\$2,375,000	\$2,375,000	\$2,375,000
	Total cost to enter into a biobanking agreement	\$48,170	\$48,170	\$48,170	\$48,170	\$48,170
	Total opportunity cost to landowner	\$0	\$1,993,750	\$3,973,750	\$5,981,250	\$7,975,000
	Total cost	\$2,423,170	\$4,416,920	\$6,396,920	\$8,404,420	\$10,398,170
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$475,000	\$475,000	\$475,000	\$475,000	\$475,000
Desired total price of credits (including profit or risk margin)	\$2,898,170	\$4,891,920	\$6,871,920	\$8,879,420	\$10,873,170	

C R E D I T P R I C E	Potential credit price					
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	
	Trust Fund Deposit amount per credit	\$5,398	\$5,398	\$5,398	\$5,398	\$5,398
	Cost to enter into a biobanking agreement per credit	\$109	\$109	\$109	\$109	\$109
	Opportunity cost to landholder per credit	\$0	\$4,531	\$9,031	\$13,594	\$18,125
	Profit margin per credit	\$1,080	\$1,080	\$1,080	\$1,080	\$1,080
	Individual credit price (total price / number of credits)	\$6,587	\$11,118	\$15,618	\$20,181	\$24,712
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$2,898,170	\$4,891,920	\$6,871,920	\$8,879,420	\$10,873,170
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$6,587	\$11,118	\$15,618	\$20,181	\$24,712
Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$4,318	\$4,318	\$4,318	\$4,318	\$4,318	
Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$5,398	\$5,398	\$5,398	\$5,398	\$5,398	

Credit pricing worksheet

S I T E	Biobank site description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Area of the proposed biobank site (ha)	55	55	55	55	55
	No. of biodiversity credits issued	440	440	440	440	440

P A R T B	Costs to enter into a biobanking agreement	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Site assessment and Biobanking Agreement Credit Report preparation	\$22,250	\$22,250	\$22,250	\$22,250	\$22,250
	Preparation of management actions	\$11,250	\$11,250	\$11,250	\$11,250	\$11,250
	Biobanking agreement application fee	\$612	\$612	\$612	\$612	\$612
	Legal fees	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
	Other	\$5,400	\$5,400	\$5,400	\$5,400	\$5,400
	Total cost to enter into a biobanking agreement (excluding interest)	\$42,012	\$42,012	\$42,012	\$42,012	\$42,012
	Loan amount for setup of biobank	\$42,500	\$42,500	\$42,500	\$42,500	\$42,500
	Interest rate (enter %) per annum	7%	7%	7%	7%	7%
	Loan period in years	2	2	2	2	2
	Interest on setup cost	\$6,158	\$6,158	\$6,158	\$6,158	\$6,158
	Total cost to enter into a biobanking agreement (including interest incurred)	\$48,170	\$48,170	\$48,170	\$48,170	\$48,170
	Opportunity cost to landowner (optional)	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Market value of land (\$ per ha)	\$0	\$36,250	\$72,250	\$108,750	\$145,000
	Total market value of land (\$ per ha x area)	\$0	\$1,993,750	\$3,973,750	\$5,981,250	\$7,975,000
Stamp duty (not applicable if property already owned)						
Total opportunity cost to landowner	\$0	\$1,993,750	\$3,973,750	\$5,981,250	\$7,975,000	

P A R T A	Total Fund Deposit	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$1,773,000	\$1,773,000	\$1,773,000	\$1,773,000	\$1,773,000

From previous worksheet
\$1,772,626

T O T A L	Total costs	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Total Fund Deposit	\$1,773,000	\$1,773,000	\$1,773,000	\$1,773,000	\$1,773,000
	Total cost to enter into a biobanking agreement	\$48,170	\$48,170	\$48,170	\$48,170	\$48,170
	Total opportunity cost to landowner	\$0	\$1,993,750	\$3,973,750	\$5,981,250	\$7,975,000
	Total cost	\$1,821,170	\$3,814,920	\$5,794,920	\$7,802,420	\$9,796,170
	Profit or risk margin as percentage of the Total Fund Deposit (enter %)	20%	20%	20%	20%	20%
	Profit or risk margin (\$) based on the Total Fund Deposit	\$354,600	\$354,600	\$354,600	\$354,600	\$354,600
Desired total price of credits (including profit or risk margin)	\$2,175,770	\$4,169,520	\$6,149,520	\$8,157,020	\$10,150,770	

C R E D I T P R I C E	Potential credit price	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
	Trust Fund Deposit amount per credit	\$4,030	\$4,030	\$4,030	\$4,030	\$4,030
	Cost to enter into a biobanking agreement per credit	\$109	\$109	\$109	\$109	\$109
	Opportunity cost to landholder per credit	\$0	\$4,531	\$9,031	\$13,594	\$18,125
	Profit margin per credit	\$806	\$806	\$806	\$806	\$806
	Individual credit price (total price / number of credits)	\$4,945	\$9,476	\$13,976	\$18,539	\$23,070
	Proportion of biodiversity credits likely to be sold (enter %)	100%	100%	100%	100%	100%
	Total amount to be received given the % of credits likely to be sold	\$2,175,770	\$4,169,520	\$6,149,520	\$8,157,020	\$10,150,770
	Individual credit price to achieve the desired total price of credits given the % likely to be sold	\$4,945	\$9,476	\$13,976	\$18,539	\$23,070
	Individual credit price to achieve 80% of the Total Fund Deposit given the % likely to be sold	\$3,224	\$3,224	\$3,224	\$3,224	\$3,224
Individual credit price to achieve 100% of the Total Fund Deposit given the % likely to be sold	\$4,030	\$4,030	\$4,030	\$4,030	\$4,030	

eco logical

AUSTRALIA

HEAD OFFICE

Suite 4, Level 1
2-4 Merton Street
Sutherland NSW
T 02 8536 8600
F 02 9542 5622

SYDNEY

Suite 604, Level 6
267 Castlereagh Street
Sydney NSW 2000
T 02 9993 0566
F 02 9993 0573

ST GEORGES BASIN

8/128 Island Point Road
St Georges Basin NSW 2540
T 02 4443 5555
F 02 4443 6655

CANBERRA

Level 4
11 London Circuit
Canberra ACT 2601
T 02 6103 0145
F 02 6103 0148

HUNTER

Suite 17, Level 4
19 Bolton Street
Newcastle NSW 2300
T 02 4910 0125
F 02 4910 0126

NAROOMA

5/20 Canty Street
Narooma NSW 2546
T 02 4476 1151
F 02 4476 1161

COFFS HARBOUR

35 Orlando Street
Coffs Harbour Jetty NSW 2450
T 02 6651 5484
F 02 6651 6890

ARMIDALE

92 Taylor Street
Armidale NSW 2350
T 02 8081 2681
F 02 6772 1279

BRISBANE

93 Boundary St
West End QLD 4101
T 0429 494 886

WESTERN AUSTRALIA

108 Stirling Street
Perth WA 6000
T 08 9227 1070
F 08 9227 1078