APPENDIX E

Commonwealth Biodiversity Offset Assessment

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DRAYTON SOUTH COAL PROJECT EPBC NO. 2011/5911: ASSESSMENT OF BIODIVERSITY OFFSETS USING THE EPBC OFFSET ASSESSMENT GUIDE

Dear Daniel,

As you are aware, the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) released a new Environmental Offsets Policy under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in October last year (SEWPaC 2012). The new EPBC Act Offsets Policy is accompanied by an Excel calculator tool that is referred to in the new EPBC Act Offsets Policy as the 'offsets assessment guide'. The offsets assessment guide is used to assess the adequacy of biodiversity offsetting measures in addressing development impacts on Matters of National Environmental Significance (MNES).

To assist in the Commonwealth assessment of the Drayton South Coal Project (the Project), SEWPaC has asked Anglo American to use the offsets assessment guide to assess the adequacy of the Project's Biodiversity Offset Package (BOP). Cumberland Ecology was requested to complete this assessment (referred to hereafter as the EPBC Offset Assessment).

The purpose of this letter is to present the key findings of the EPBC Offset Assessment and to discuss the implications for the Project. The scores, rationales, assumptions and references used in the offsets assessment guide have been explained in detail and are appended to this letter.

1. Background

1.1 The Offset Assessment Guide

The offsets assessment guide (SEWPaC 2012) was designed for SEWPaC's use to assist in the assessment of the suitability of direct offsets proposed for

development projects. It provides a prescriptive method for measuring the loss of biodiversity values at a development site and the gain in biodiversity values at an offset site. The offset assessment guide expresses the value of a proposed direct offsetting measure as a percentage of the development's offsetting requirement. The biodiversity impacts of a development are considered to be adequately compensated for by SEWPaC if the direct biodiversity offsets meet at least 90% of the offsetting requirement.

Under the new EPBC Act Offsets Policy, the remaining 10% of a development's offsetting requirement can comprise indirect offsets, such as a financial contribution to research or education programs.

1.2 Predicted Impacts to Matters of National Environmental Significance

The Project will allow for the continuation of mining at Drayton Mine by the development of open cut and highwall mining operations within the Drayton South area (Drayton South) while continuing to utilise the existing infrastructure and equipment from Drayton Mine. As part of the development and operation of the open cut mine at Drayton South, it was recognised that the Project will require the direct removal of habitat for a number of MNES (Cumberland Ecology 2012); the relevant MNES and the predicted impacts on these MNES are summarised in **Table 1** below.

1.3 Biodiversity Offset Package

To address these ecological impacts, a substantial Biodiversity Offset Package (BOP) with a "maintain or improve" approach was developed. The BOP incorporates various onsite and offsite components to compensate for the residual ecological impacts of the Project once avoidance and mitigation measures have been implemented.

The BOP includes the following components:

- Onsite Offsets, which is the protection and improvement of conservation areas within the Study Area:
  - Conservation of vegetation along the primary ridgeline in the Study Area;
  - The restoration and enhancement of Saddlers Creek and the wildlife corridor;
  - Rehabilitation of the Project Disturbance Footprint; and
- Offsite Offset, which is the acquisition, long-term protection and improvement of an offset property located outside of the Study Area.

A summary of the location, area and land tenure of the BOP components is provided in **Table 2** below. Note that the rehabilitation of the Project Disturbance Footprint (i.e. mine rehabilitation) was not assessed within the EPBC Offset Assessment. It was assumed that mine rehabilitation is not being used to offset impacts to MNES. A brief description of each of the remaining BOP components has been included in this letter (see **Section 1.3.1** and **Section 1.3.2**).

Table 1 MNES that will be Significantly Impacted by the Project

Common Name	Scientific Name	EPBC Status	Preferred Habitat	Used For	Present or Likely to be Present in the Study Area	Area of Direct Impact (ha)
Threatened Communities						
Condition B Box-Gum Woodland (i.e. no overstorey, only understorey present)	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	-	-	Y	107
Condition C Box-Gum Woodland (i.e. overstorey and understorey present)	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	-	-	Y	74
Threatened Flora						
Lobed Blue-grass	*Bothriochloa biloba*	V	F, W, G	-	Y	1935
Threatened Fauna						
Regent Honeyeater	*Anthochaera phrygia*	E, Mi	F, W	Infrequent Foraging; low numbers	Y (low)	389
Swift Parrot	*Lathamus discolor*	E, Ma	F, W	Infrequent Foraging; low numbers	Y (low)	389
Greater Long-eared Bat	*Nyctophilus corbeni*	V	F, W	Foraging and roosting as part of a larger home range	Y	389

Key: *V = Vulnerable; E = Endangered; CE = Critically Endangered; Mi = Migratory; Ma = Marine*

Table 2:
Summary of Biodiversity Offsets for the Drayton South Coal Project (2011/5911)

Biodiversity offset property					Box Gum Woodland		HABITAT for Matters of National Environmental significance (Regent Honeyeater, Swift Parrot, Greater Long-eared Bat)		Combined Total HABITAT
Property (describe each discrete property separately)	**Size property (ha)**	**Location property (map coordinates Lat/Long)***	**Current tenure (+security of acquisition)**	**Proposed long-term protection mechanism (covenant, CA, National Parks etc.)**	**[1]Condition C: Remnant vegetation habitat (ha)**	**[2]Condition B: Derived native grassland (ha)**	**Remnant vegetation habitat (ha)**	**Re-vegetation of grassland to woodland habitat (ha)**	**Remnant and restoration areas (ha)**
ONSITE OFFSET									
Restoration of Saddlers Creek	*86*	*-32.4169, 150.809*	*Anglo American ownership*	*To be agreed in consultation with OEH and SEWPAC, options considered include CA*	*20*	*-*	*24*	*62*	***86***
Conservation of Existing Vegetation on the Primary Ridgeline	*85*	*-32.4384, 150.851*	*Anglo American ownership*	*To be agreed in consultation with OEH and SEWPAC, options considered include CA*	*-*	*-*	*85*	*-*	***85***
*Mine Rehabilitation and Revegetation****	*1403*	*-32.4172, 150.849*	*Anglo American ownership*	*To be agreed in consultation with OEH and SEWPAC, options considered include CA*	*-*	*-*	*-*	*1403*	***1403***
OFFSITE OFFSET	*2079*	*-31.6977, 150.819*	*Private ownership. Under an option to purchase agreement*	*To be agreed in consultation with OEH and SEWPAC, options considered include CA*	*774*	*802***	*1181*	*898*	***2079***
TOTAL	***3653***				***794***	***802***	***1290***	***2363***	***3653***

*Central point of relevant offset area. Projection: Latitude/Longitude (GDA 94)

**Grassland map has been updated since EA and is presented and discussed in the Response to Submissions (Hansen Bailey, 2013)

***Does not offset any impacts to MNES and has been excluded from the offsets assessment guide calculations

[1] A native understorey exists, but the trees have been cleared.

[2] Both a native understorey and an overstorey of eucalypts exist in conjunction.

1.3.1 The Onsite Offsets

The Onsite Offsets lie within the Saddlers Creek catchment, which is part of the larger Hunter River catchment area (13,400 km^2). Other sub-catchments within or in the vicinity of the Onsite Offsets include those associated with Plashett Dam (approximately 800 ha and also known as Saltwater Creek), Whites Creek, Fairford Creek, Parnell Creek and some smaller, unnamed creeks.

i. Restoration of Saddlers Creek

The restoration of Saddlers Creek will involve the retention and improvement of 24 ha of Box Gum Woodland that is situated within the immediate vicinity of Saddlers Creek. In addition to this, there is an opportunity to restore an additional 62 ha of grassland to Box Gum Woodland through the planting of native vegetation. This restoration work will be carried out in conjunction with the Hunter Catchment Management Authority. In addition to planting, the following works are also proposed:

- Protecting existing ponds from damage by excluding livestock and fencing riparian areas;
- Densely vegetating the in-stream within *Phragmites* and other aquatic vegetation to trap sediment and prevent erosion;
- Creating pools and sediment bars by creating rock weirs;
- Soil conservation earthworks; and
- Reinstating snags and woody debris to provide habitat complexity for aquatic fauna.

ii. Conservation of Existing Vegetation along the Primary Ridgeline

In addition to the rehabilitation of native vegetation along Saddlers Creek, approximately 85 ha of existing vegetation along the primary ridgeline in the Study Area will be conserved. These areas will have direct connectivity with adjacent re-vegetated communities established as part of the mine rehabilitation. Areas of native vegetation that will be conserved in the Study Area will be managed for conservation including weed and feral animal control and other management actions as required for maintaining and enhancing their conservation value.

1.3.2 The Offsite Offset

The Offsite Offset is an approximately 2079 ha grazing property situated in the undulating hills near the township of Murrurundi in the Liverpool Plains local government area (LGA). It is located approximately 75 km north of the Project within the southern extremity of Nandewar Bioregion, at its boundary with the Sydney Basin Bioregion. The Offsite Offset does not adjoin a conservation reserve; however, several are located within the locality.

The Offsite Offset features relatively steep country that ranges from 500 to 900 metres in elevation and receives a high annual rainfall. The eastern half of the property occurs on soils

derived from basalt whilst the western half occurs on soils derived from mudstone. The property is currently used for stock grazing (sheep and cattle) and some areas have been improved, producing a mixture of native and improved pastures. Nevertheless, the property is well vegetated and continues to support extensive areas of diverse remnant woodland and open forest with a natural or semi-natural understorey. Natural regeneration of a number of tree species is prolific across the property.

Two semi-permanent creeks and their tributaries, Chilcotts Creek and Back Creek, flow through the Offsite Offset and contain water for the majority of the year. The property largely drains to the Namoi catchment, although a small proportion of the property is within the Hunter catchment. Dams have been established throughout the property to supply water for livestock.

Management objectives for the Offsite Offset include the following:

- Maintenance and improvement of the condition of existing forest and woodland within all offset areas, specifically to improve conditions for threatened flora and fauna;
- Maintenance and improvement of derived native grassland areas to promote, through management of grazing pressure, natural succession towards woodland and or open forest;
- Rehabilitation of selected areas of derived native grassland by replanting trees and shrubs to promote a more rapid regeneration towards forest or woodland; and
- Improvement of habitat connectivity across the property, and to adjacent native vegetation in order to improve wildlife movement in the long term.

1.3.3 Security of the Offsets

The offset lands will be permanently protected by an appropriate mechanism. There are a number of options that are available to permanently protect land for conservation and these include:

- Conservation Agreements (CA), which are a joint agreement between landowners and the Minister for the Environment under the *National Parks and Wildlife Act 1974*;
- Conservation convenants under Section 88 of the *Conveyancing Act 1919*; this is a joint agreement between the landowner and an authorised body;
- Application to change zoning regulation that dictates land use;
- Dedication of land to the National Parks reserve estates; and
- Land acquisition and management of the land under private ownership with conditions of commitment.

The final method of security will be decided on by Anglo American in consultation with relevant agencies.

2. Method of Assessment

Cumberland Ecology carried out the EPBC Offset Assessment in accordance with the offsets assessment guide. In **Appendix A** of this letter, copies of the offset assessment guide have been attached for each relevant MNES. **Appendix B** contains forms completed for each relevant MNES; these forms tabulate the numerical values that were entered into the offsets assessment guide, explanations for the values chosen and background references considered in the preparation of the assessment.

2.1 Assessment of Impacts

In the assessment of the impacts, the offsets assessment guide was used to calculate the offset requirements of the Project for each relevant MNES listed in **Table 1**.

As indicated in **Table 1**, the woodland form of Box Gum Woodland (i.e. Condition C Box Gum Woodland) was assessed separately to the Derived Native Grassland form of Box Gum Woodland (i.e. Condition B Box Gum Woodland). This enabled different quality scores to be assigned to the woodland and grassland forms of Box Gum Woodland.

2.2 Assessment of Offsets

In the assessment of the offset areas, the remnant woodland and forest vegetation was also assessed separately to the grassland areas. Again, this enabled different quality scores to be assigned to the woodland and grassland components of the BOP. The offsets assessment guide was completed initially for existing remnant woodland and forest vegetation that is to be protected and maintained; the offsets assessment guide was then completed again for grassland areas that are to be restored to woodland and forest habitat.

The results of each woodland and grassland component of the BOP were added to arrive at a final result for each MNES.

In the Offsite Offset, Derived Native Grassland (Condition B) was distinguished from "low diversity" Derived Native Grassland that does not meet the EPBC Act condition thresholds, but which is listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act). These grassland types were assessed separately and added to provide a final result for Condition B Box Gum Woodland.

2.3 Box Gum Woodland as a Surrogate for *Bothriochloa biloba* Habitat

This grass species is widespread in the Hunter Valley and has been delisted as a threatened species in New South Wales under the TSC Act because it is much more common and widespread than originally thought at the time it was listed under the TSC Act. Notwithstanding that, it is listed as a Vulnerable species under the EPBC Act and was duly considered within the Ecology Impact Assessment (EIA) as part of the Environmental Assessment (EA) for the Project (Cumberland Ecology 2012).

When a Referral Application for the Project was submitted to SEWPaC in 2011, *Bothriochloa biloba* was not originally nominated as a MNES that would be significantly impacted, although

subsequently it was recorded on site. The EIA concluded that the Project would technically have potential to significantly impact the species, since the Project could introduce exotic grasses into the Study Area that could out-compete the species, such as African Lovegrass (*Eragrostis curvula*), Paspalum (*Paspalum dilatatum*), Rhodes Grass (*Chloris gayana*) and Coolatai Grass (*Hyparrhenia hirta*). The EIA took a precautionary approach and estimated the impacts of the Project on *Bothriochloa biloba* on the assumption that the entire grassland and woodland habitat in the Project Disturbance Footprint is potential habitat for the species.

Despite the above, *Bothriochloa biloba* is unlikely to occur in all of the woodland and grassland habitats within the Project Disturbance Footprint or the offset areas. The species is known to occur in highly diverse and relatively undisturbed native pastures but does not tend to occur within the more degraded examples of native pastures or within exotic pastures. The precise areas of highly diverse grassland habitats within the Project Disturbance Footprint and offset areas are not available for analysis since they generally occur as a mosaic of patches within the larger grassland vegetation unit. Thus, it is difficult to accurately quantify the areas of *Bothriochloa biloba* habitat to apply to this EPBC Offsets Assessment.

As an alternative approach, we have used Box Gum Woodland (both remnant woodland and Derived Native Grassland) as a surrogate for *Bothriochloa biloba* habitat. The species was recorded within the relatively fertile grassy Box Gum Woodland habitats in the Study Area in 2000 and 2009 during surveys conducted for the EA and has also been recorded within Box Gum Woodland during surveys of the Mt Arthur Coal Mine lease just north of Saddlers Creek. The species was not recorded within less fertile, more sparsely grassed habitats such as within Slaty Box Woodland. Therefore, the use of Box Gum Woodland (and Derived Native Grassland) as a surrogate for *Bothriochloa biloba* habitat is considered to be appropriate.

3. Key Findings

The results of the offsets assessment guide indicate that the BOP is likely to address over 90% of the direct offsetting requirements for impacts to all the MNES listed in **Table 1**; the results of the EPBC Offsets Assessment are summarised in **Table 3** below.

Table 3 Summary of the Results of the EPBC Offsets Assessment

Relevant MNES	Actual Impact (ha)	Direct Offsetting Requirement (ha)	Actual Offset (ha)	Adjusted Offset (ha)	% of impact offset	90% minimum met?
Box Gum Woodland 'Condition B'	107	53.5	898	55.31	103.38	Yes
Box Gum Woodland 'Condition C'	74	44.4	856	83.98	189.14	Yes
Swift Parrot	389	233.4	2253	367.33	157.38	Yes
Regent Honeyeater	389	233.4	2253	367.33	157.38	Yes

Table 3 Summary of the Results of the EPBC Offsets Assessment

Relevant MNES	Actual Impact (ha)	Direct Offsetting Requirement (ha)	Actual Offset (ha)	Adjusted Offset (ha)	% of impact offset	90% minimum met?
Greater Long-eared Bat	389	233.4	2253	407.49	174.59	Yes
Lobed Blue-grass	107	53.5	898	55.31	103.38	Yes

This indicates that no further direct offsets are required for the Project for predicted impacts to MNES,

We would be happy to discuss any aspect of this assessment in further detail. Please do not hesitate to contact either myself or Cecilia Phu on (02) 9868 1933.

Yours sincerely

David Robertson

Dr David Robertson
Director
David.Robertson@cumberlandecology.com.au

4. References

Cumberland Ecology. (2012). *Drayton South Ecology Impact Assessment - Final Report*. Carlingford Court, NSW.

SEWPaC. (2012). *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy. October 2012*. Department of Sustainability, Environment, Water, Population and Communities, Canberra.

Appendix A

Offset Assessment Guide Spreadsheets

A.1 Contents

This appendix contains the following offsets assessment guide spreadsheets:

1. Condition B Box Gum Woodland – Part 1
2. Condition B Box Gum Woodland – Part 2
3. Condition C Box Gum Woodland – Part 1
4. Condition C Box Gum Woodland – Part 2
5. Swift Parrot – Part 1
6. Swift Parrot – Part 2
7. Regent Honeyeater – Part 1
8. Regent Honeyeater – Part 2
9. Greater Long-eared Bat – Part 1
10. Greater Long-eared Bat – Part 2

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	White Box - Yellow Box -
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	**6.8%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes	Loss of 107 ha of Condition B Box Gum Woodland i.e. Derived Native Grassland	**Area**	107	Hectares	
			Quality	5	Scale 0-10	
			Total quantum of impact	53.50	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	53.50	Adjusted hectares	Part 1: Restoration of 802 ha of Condition B Box Gum Woodland to Condition C Box Gum Woodland	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	802	**Risk of loss (%) without offset**	25%	**Risk of loss (%) with offset**	3%	176.44	95%	167.62	44.97	49.40	92.34%	Yes		
									Future area without offset (adjusted hectares)	601.5	**Future area with offset (adjusted hectares)**	777.9									
					Time until ecological benefit	15	**Start quality (scale of 0-10)**	5	**Future quality without offset (scale of 0-10)**	4	**Future quality with offset (scale of 0-10)**	6	2.00	50%	1.00	0.37					
Threatened species habitat																					
Area of habitat	No				**Time over which loss is averted (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**										
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0									
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**										
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0				$0.00		$0.00
Area of community	53.5	49.40	92.34%	**Yes**	$0.00	#DIV/0!	#DIV/0!
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	White Box - Yellow Box -
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	**6.8%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes	Loss of 107 ha of Condition B Box Gum Woodland i.e. Derived Native Grassland	**Area**	107	Hectares	
			Quality	5	Scale 0-10	
			Total quantum of impact	53.50	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	53.50	Adjusted hectares	Part 2: Restoration of 96 ha of low diversity Derived Native Grassland (does not currently meet Condition B diversity thresholds) to Condition C Box Gum Woodland	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	96	**Risk of loss (%) without offset**	25%	**Risk of loss (%) with offset**	3%	21.12	95%	20.06	5.38	5.91	11.05%	No		
									Future area without offset (adjusted hectares)	72.0	**Future area with offset (adjusted hectares)**	93.1									
					Time until ecological benefit	15	**Start quality (scale of 0-10)**	4	**Future quality without offset (scale of 0-10)**	4	**Future quality with offset (scale of 0-10)**	6	2.00	50%	1.00	0.37					
Threatened species habitat																					
Area of habitat	No				**Time over which loss is averted (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**										
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0									
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**										
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0				$0.00		$0.00
Area of community	53.5	5.91	11.05%	**No**	$0.00	#DIV/0!	#DIV/0!
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	White Box - Yellow Box -
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	**6.8%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes	Loss of 74 ha of Condition C Box Gum Woodland	**Area**	74	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	44.40	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	44.40	Adjusted hectares	Part 1: Protection and Improvement of 794 ha of Condition C Box Gum Woodland	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	794	**Risk of loss (%) without offset**	20%	**Risk of loss (%) with offset**	3%	134.98	95%	128.23	34.40	80.16	180.54%	Yes		
									Future area without offset (adjusted hectares)	635.2	**Future area with offset (adjusted hectares)**	770.2									
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	7	**Future quality without offset (scale of 0-10)**	6	**Future quality with offset (scale of 0-10)**	8	2.00	80%	1.60	0.83					
Threatened species habitat																					
Area of habitat	No				**Time over which loss is averted (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**										
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0									
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**										
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0				$0.00		$0.00
Area of community	44.4	80.16	180.54%	**Yes**	$0.00	N/A	$0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	White Box - Yellow Box -
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	**6.8%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes	Loss of 74 ha of Condition C Box Gum Woodland	**Area**	74	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	44.40	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	44.40	Adjusted hectares	Part 2: Protection, Rehabilitation and Maintenance of Native Pasture to Condition C Box Gum Woodland	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	62	**Risk of loss (%) without offset**	25%	**Risk of loss (%) with offset**	3%	13.64	95%	12.96	3.48	3.82	8.60%	No		
									Future area without offset (adjusted hectares)	46.5	**Future area with offset (adjusted hectares)**	60.1									
					Time until ecological benefit	15	**Start quality (scale of 0-10)**	**4**	**Future quality without offset (scale of 0-10)**	**4**	**Future quality with offset (scale of 0-10)**	**6**	2.00	50%	1.00	0.37					
Threatened species habitat																					
Area of habitat	No				**Time over which loss is averted (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**										
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0									
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**										
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0				$0.00		$0.00
Area of community	44.4	3.82	8.60%	**No**	$0.00	#DIV/0!	#DIV/0!
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Lathamus discolor (Swift Parrot)
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Loss of 389 ha of existing foraging habitat for Swift Parrot	**Area**	389	Hectares	
			Quality	6	Scale 0-10	
			Total quantum of impact	233.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	233.40	Adjusted hectares	Part 1: Protection and Improvement of 1290 ha of Existing Foraging Habitat for Swift Parrot	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	1290	**Risk of loss (%) without offset**	20%	**Risk of loss (%) with offset**	3%								
									Future area without offset (adjusted hectares)	1032.0	**Future area with offset (adjusted hectares)**	1251.3	219.30	95%	208.34	164.12	280.00	119.97%	Yes	
					Time until ecological benefit	0	**Start quality (scale of 0-10)**	6	**Future quality without offset (scale of 0-10)**	5	**Future quality with offset (scale of 0-10)**	7	2.00	80%	1.60	1.60				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	233.4	280.00	119.97%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Lathamus discolor (Swift Parrot)
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Loss of 389 ha of Existing Foraging Habitat for Swift Parrot	**Area**	389	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	233.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	233.40	Adjusted hectares	Part 2: Restoration of 960 ha of native pastures to woodland and forest habitat for Swift Parrot	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	960	**Risk of loss (%) without offset**	10%	**Risk of loss (%) with offset**	3%	67.20	95%	63.84	50.29	87.33	37.42%	No	
									Future area without offset (adjusted hectares)	864.0	**Future area with offset (adjusted hectares)**	931.2								
					Time until ecological benefit	15	**Start quality (scale of 0-10)**	1	**Future quality without offset (scale of 0-10)**	1	**Future quality with offset (scale of 0-10)**	3	2.00	50%	1.00	0.84				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	233.4	87.33	37.42%	**No**	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Anthochaera phrygia (Regent
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Loss of 389 ha of Existing Foraging Habitat for Regent Honeyeater	**Area**	389	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	233.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No	winter-flowering e				
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	233.40	Adjusted hectares	Part 1: Protection and Improvement of 1290 ha of Existing Foraging Habitat for Regent Honeyeater	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	1290	**Risk of loss (%) without offset**	20%	**Risk of loss (%) with offset**	3%	219.30	95%	208.34	164.12	280.00	119.97%	Yes	
									Future area without offset (adjusted hectares)	1032.0	**Future area with offset (adjusted hectares)**	1251.3								
					Time until ecological benefit	0	**Start quality (scale of 0-10)**	**6**	**Future quality without offset (scale of 0-10)**	**5**	**Future quality with offset (scale of 0-10)**	**7**	2.00	80%	1.60	1.60				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	233.4	280.00	119.97%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Anthochaera phrygia (Regent
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Loss of 389 ha of Existing Foraging Habitat for Regent Honeyeater	**Area**	389	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	233.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No	winter-flowering e				
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**										
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0									
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**										
Threatened species habitat																					
Area of habitat	Yes	233.40	Adjusted hectares	Part 2: Restoration of 960 ha of native pastures to woodland and forest habitat for Regent Honeyeater	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	960	**Risk of loss (%) without offset**	10%	**Risk of loss (%) with offset**	3%	67.20	95%	63.84	50.29	87.33	37.42%	No		
									Future area without offset (adjusted hectares)	864.0	**Future area with offset (adjusted hectares)**	931.2									
					Time until ecological benefit	15	**Start quality (scale of 0-10)**	1	**Future quality without offset (scale of 0-10)**	1	**Future quality with offset (scale of 0-10)**	3	2.00	50%	1.00	0.84					
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	233.4	87.33	37.42%	**No**	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Nyctophilus corbeni (Greater
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Loss of 389 ha of potential existing foraging habitat for Greater Long-eared Bat	**Area**	389	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	233.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**										
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0									
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**										
Threatened species habitat																					
Area of habitat	Yes	233.40	Adjusted hectares	Part 1 - Protection and Improvement of Existing Foraging Habitat for Greater Long-eared Bat	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	1290	**Risk of loss (%) without offset**	20%	**Risk of loss (%) with offset**	3%									
									Future area without offset (adjusted hectares)	1032.0	**Future area with offset (adjusted hectares)**	1251.3	219.30	95%	208.34	200.17	305.24	130.78%	Yes		
					Time until ecological benefit	0	**Start quality (scale of 0-10)**	**6**	**Future quality without offset (scale of 0-10)**	**5**	**Future quality with offset (scale of 0-10)**	**7**	2.00	80%	1.60	1.60					
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	233.4	305.24	130.78%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Nyctophilus corbeni (Greater
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Loss of 389 ha of potential existing foraging habitat for Greater Long-eared Bat	**Area**	389	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	233.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No	winter-flowering e				
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	233.40	Adjusted hectares	Part 2 - Protection and restoration of 960 ha of native pastures to woodland for Greater Long-eared Bat	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	960	**Risk of loss (%) without offset**	10%	**Risk of loss (%) with offset**	3%								
									Future area without offset (adjusted hectares)	864.0	**Future area with offset (adjusted hectares)**	931.2	67.20	95%	63.84	61.34	102.25	43.81%	No	
					Time until ecological benefit	15	**Start quality (scale of 0-10)**	**1**	**Future quality without offset (scale of 0-10)**	**1**	**Future quality with offset (scale of 0-10)**	**3**	2.00	50%	1.00	0.97				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	233.4	102.25	43.81%	**No**	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Appendix B

Assumptions, Rationales, References

B.1 Contents

This appendix contains the following forms providing assumptions and rationales used:

11. Condition B Box Gum Woodland – Part 1
12. Condition B Box Gum Woodland – Part 2
13. Condition C Box Gum Woodland – Part 1
14. Condition C Box Gum Woodland – Part 2
15. Swift Parrot – Part 1
16. Swift Parrot – Part 2
17. Regent Honeyeater – Part 1
18. Regent Honeyeater – Part 2
19. Greater Long-eared Bat – Part 1
20. Greater Long-eared Bat – Part 2

EPBC OFFSET ASSESSMENT - ASSUMPTIONS, RATIONALES AND SOURCE REFERENCES

Project Number: **EPBC 2011/5911**

MNES Matter: **(Condition B) White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland**

Value in calculation	Score				Explanation	Rationale	Source
IMPACTS: Loss of 107 ha of Condition B Box Gum Woodland i.e. Derived Native Grassland							
Area of community on impact site (ha)	107 ha						Drayton South Coal Project Ecology Impact Assessment (EIA) (Cumberland Ecology 2012): Chapter 7 (Table 7.1)
Weighting allocation to quality (applies to both impact and offset quality scores)	Context	Condition	Stocking rate	TOTAL	*Context: connectivity values, importance of site in relation to overall spp. population or community, threats nearby?* *Condition: structure, diversity, presence of habitat features, resilience.* *Spp. Stocking rate: presence of species on site, density, importance of population on site in relation to overall population.*	The weighting is shared equally between <u>condition</u> and <u>context</u> because condition and landscape factors such as connectivity and patch size are important influences of viability of the community. <u>Stocking rate:</u> not applicable to vegetation communities and has been assigned zero weighting.	Commonwealth Listing Advice on White Box-Yellow Box-Blakelyi's Red Gum Grassy Woodland and Derived Native Grassland; Point 4 regarding Condition Classes (Threatened Species Scientific Committee 2006).
	50%	50%	0%	100%			
Quality of impact site	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the site.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10)*	<u>Context:</u> the areas of Derived Native Grassland are associated with remnant Box Gum Woodland and have potential to be regenerated, thus augmenting the remnant patches. <u>Condition:</u> dominated by native grasses and contains native herbs. Diversity of herbs varies seasonally but is present. However, composition of native grasses has been modified through grazing and supports hardy species such as *Aristida* spp., *Austrostipa* spp. and *Bothriochloa* spp. rather than more palatable and grazing sensitive species such as *Poa* spp. and *Themeda australis.* Also, in some areas, the growth of native understorey species is suppressed and occurs in highly altered forms (mat-forming and low-lying rather than large tussock).	EIA (Cumberland Ecology 2012): Chapter 5 'description of the vegetation'.
	5	4	0	**5**			

OFFSETS – Part 1: Restoration of 802 ha of Condition B Box Gum Woodland to Condition C Box Gum Woodland							
Area of community on offset properties (ha)	802 ha				*List the properties that these remnants are located on.*	**Offsite Offset:** 802 ha	EIA (Cumberland Ecology 2012): Chapter 10 (Table 10.7).
Current quality of offset site(s)	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the offset.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: the areas of Derived Native Grassland are associated with remnant Box Gum Woodland and have potential to be regenerated, thus augmenting the remnant patches. Condition: dominated by native grasses and contains native herbs. Areas of *Themeda australis* and *Poa labillardieri* (i.e. large tussock grasses) present. Diversity of herbs varies seasonally but is present and understories showing evidence of natural regeneration of eucalypt species.	EIA (Cumberland Ecology 2012): Chapter 10 'Offsite Offset Property'.
	5	5	0	**5**			
Future quality of offset site(s) without offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset without protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: no change expected. Surrounding properties are not expected to undergo change in land use that would change the context values of the offsite offset. Condition: vegetation expected to decline under current management practices. Slashing, ringbarking and maintenance of pastures currently taking place on Offsite Offset. Weeds like Sweet Briar could become a problem. St John's Wort a known problem in the district.	EIA (Cumberland Ecology 2012): Chapter 5 (description of vegetation condition), Chapter 7 (description of impacts) and Chapter 10 (description of the offsite offsets).
	5	3	0	**4**			
Future quality of offset site(s) with offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset with protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: the areas of Derived Native Grassland are associated with remnant Box Gum Woodland and have potential to be regenerated, thus augmenting the remnant patches. Condition: Will improve under improvement and management works, such as weeding, feral control and grazing management. Cessation of ringbarking and slashing activities will allow vegetation to naturally regenerate. Additional planting will expedite the recovery of woody vegetation in Derived Native Grassland areas.	EIA (Cumberland Ecology 2012): Chapter 9 (description of the BOP) and Chapter 10 (description of the offsite offsets). A Guide to Native Pasture Management (DPI (VIC) n.d). A Guide to Managing Box Gum Grassy Woodlands (Rawlings *et al.* 2010). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008).
	6	6	0	**6**			
Time	20 years				*Time over which loss is averted,*	The life of the mine is more than 20 years – a	EIA (Cumberland Ecology 2012):

horizon (years)		*the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified. The number entered into this cell should be the duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.*	large proportion of restoration and rehabilitation will be well advanced after this time.	Section 1.1 'Project Description'.
Time until ecological benefit	15 years	*The time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matters.*	Time to ecological benefit can potentially take 15 years before the trees and shrubs mature and the understorey approaches minimum benchmark values.	Residual Matters Report, Boggabri Coal; Section 2.7.2 and Section 2.7.3 (Parsons Brinckerhoff Australia Pty Ltd 2011).
Risk of loss without offset %	25%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the absence*** *of any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on:* • *presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent;* • *average risk of loss for similar sites; and* • *presence and strength of formal protection mechanisms currently in place.*	Risk of loss without offset is estimated to be 25% because the proposed offsets are located in a valuable farming area and are in zones of active farming. There are no formal protection mechanisms in place to protect the vegetation from some permitted types of clearing or other agricultural activities under the current 1(a) Agricultural zoning. There is a potential risk of loss if landowners opt to increase their stocking rates substantially above current stocking rates - unsure how likely this would be over next 20 years.	This estimate is based upon Cumberland Ecology research in the locality and the observed rate of clearing and disturbance to unreserved farmland/grazing lands that has been occurring.
Risk of loss with offset %	3%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the presence*** *of any formal protection and/or management over a foreseeable time period (20 years). This is the background rates of loss.*	Risk of loss with offset estimated to be 3% because a protection mechanism is likely to extinguish risk of further clearing to expand agricultural capacity of the land or increase carrying capacity for livestock. However, a conservation covenant is unlikely to completely remove risks due to residual factors such as illegal clearing, natural disasters such as fires, and uncontrolled access by livestock or	As above, this estimate is based upon the nature and extent of woodland regeneration in areas protected from grazing.

			ferals and edge impacts due to proximity of land use.	
Confidence in result % (averted loss)	95%	*This is the confidence in the strength and effectiveness of the protection mechanism.*	Confidence in averted loss is set at 95% assuming there is a very high level of protection afforded by the conservation agreement.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss.
Confidence in result % (change in habitat quality)	50%	*This is the confidence in the effectiveness of the proposed improvement measures.*	Confidence in quality is 50% as trees and shrubs will be planted; ongoing management under a biodiversity management plan will increase the chances of success. Understorey is presently in moderate to good condition and has a good opportunity to recover through assisted natural regeneration. Rehabilitation measures, such as exclusion fencing and buffer planting are likely to protect the vegetation from ongoing edge impacts and allow it to establish.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss. EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package. Anglo has a track record of restoration success at Dartbrook with the River Red Gum Restoration project: Dartbrook River Red Gum Restoration Project (Anglo Coal 2008, Anglo Coal (Dartbrook Management) Pty Ltd 2010). Spring 2009 Monitoring of River Red Gum (*Eucalyptus camaldulensis*) at Dartbrook Mine, Hunter Valley (Umwelt (Australia) Pty Limited 2010). Native Understorey Species Regeneration at NSW Coal Mines.

<table>
<tr><td></td><td></td><td></td><td></td><td>Final Report (Gillespie et al. 2001).
Biodiversity in the Paddock: a Land Managers Guide (Dorrough et al. 2008).</td></tr>
<tr><td>Cost ($ total)</td><td></td><td>The overall cost of the proposed offsets package; including costs associated with, but not limited to:
• acquisition and transfer of lands/property;
• implementation of all related management actions; and
• monitoring, reporting and auditing of offset performance.</td><td></td><td></td></tr>
<tr><td colspan="5">OFFSETS – Part 2: Restoration of 96 ha of low diversity Derived Native Grassland (does not currently meet Condition B diversity thresholds) to Condition C Box Gum Woodland</td></tr>
<tr><td>Area of community on offset properties (ha)</td><td colspan="4">96 ha</td><td>List the properties that these remnants are located on.</td><td>Offsite Offset: 96 ha</td><td>EIA (Cumberland Ecology 2012): Chapter 10 (Table 10.7).</td></tr>
<tr><td rowspan="2">Current quality of offset site(s)</td><td>Context</td><td>Condition</td><td>Stocking rate</td><td>TOTAL (weighting applied)</td><td rowspan="2">Current quality of the offset.
Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).</td><td rowspan="2"><u>Context:</u> the areas of native pasture are associated with remnant Box Gum Woodland and have potential to be regenerated, thus augmenting the remnant patches.
<u>Condition:</u> Is still native pasture and contains native species; however, diversity does not meet the EPBC Condition Criteria</td><td rowspan="2">EIA (Cumberland Ecology 2012): Chapter 10 ‘Offsite Offset Property’.</td></tr>
<tr><td>5</td><td>3</td><td>0</td><td>4</td></tr>
<tr><td rowspan="2">Future quality of offset site(s) without offset</td><td>Context</td><td>Condition</td><td>Stocking rate</td><td>TOTAL (weighting applied)</td><td rowspan="2">Future quality of the offset without protection.
Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).</td><td rowspan="2"><u>Context:</u> no change expected. Surrounding properties are not expected to undergo change in land use that would change the context values of the offsite offset.
<u>Condition:</u> vegetation expected to decline under current management practices. Slashing, ringbarking and maintenance of pastures currently taking place on Offsite Offset. Weeds like Sweet Briar could become a problem. St John’s Wort a known problem in the district.</td><td rowspan="2">EIA (Cumberland Ecology 2012): Chapter 5 (description of vegetation condition), Chapter 7 (description of impacts).</td></tr>
<tr><td>5</td><td>2</td><td>0</td><td>4</td></tr>
</table>

<table>
<tr><td rowspan="2">Future quality of offset site(s) with offset</td><td>Context</td><td>Condition</td><td>Stocking rate</td><td>TOTAL (weighting applied)</td><td rowspan="2">Future quality of the offset with protection.
Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).</td><td rowspan="2"><u>Context:</u> the areas of native pasture are associated with remnant Box Gum Woodland and have potential to be regenerated, thus augmenting the remnant patches.
<u>Condition:</u> Will improve under improvement and management works, such as weeding, feral control and grazing management. Cessation of ringbarking and slashing activities will allow vegetation to naturally regenerate.</td><td rowspan="2">EIA (Cumberland Ecology 2012): Chapter 9 (description of the BOP) and Chapter 10 (description of the offsite offsets).
A Guide to Native Pasture Management (DPI (VIC) n.d).
A Guide to Managing Box Gum Grassy Woodlands (Rawlings et al. 2010).
Biodiversity in the Paddock: a Land Managers Guide (Dorrough et al. 2008).</td></tr>
<tr><td>6</td><td>5</td><td>0</td><td>6</td></tr>
<tr><td>Time horizon (years)</td><td colspan="4">20 years</td><td>Time over which loss is averted, the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified. The number entered into this cell should be the duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.</td><td>The life of the mine is more than 20 years – a large proportion of restoration and rehabilitation will be well advanced after this time.</td><td>EIA (Cumberland Ecology 2012): Section 1.1 ‘Project Description’.</td></tr>
<tr><td>Time until ecological benefit</td><td colspan="4">15 years</td><td>The time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matters.</td><td>Time to ecological benefit can potentially take 15 years before the trees and shrubs mature and the understorey approaches minimum benchmark values.</td><td>Residual Matters Report, Boggabri Coal; Section 2.7.2 and Section 2.7.3 (Parsons Brinckerhoff Australia Pty Ltd 2011).</td></tr>
<tr><td>Risk of loss without offset %</td><td colspan="4">25%</td><td>The risk of damage, degradation or destruction to any proposed offset site(s) in the absence of any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on:
• presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent;
• average risk of loss for similar</td><td>Risk of loss without offset is estimated to be 25% because the proposed offsets are located in a valuable farming area and are in zones of active farming.
There are no formal protection mechanisms in place to protect the vegetation from some permitted types of clearing or other agricultural activities under the current 1(a) Agricultural zoning.
There is a potential risk of loss if landowners opt to increase their stocking rates substantially above current stocking rates - unsure how likely this would be over next 20 years.</td><td>EIA (Cumberland Ecology 2012): Chapter 7 ‘Impact Assessment’, Chapter 8 ‘Impact mitigation’ and Chapter 9 ‘Biodiversity Offset Package’.</td></tr>
</table>

		sites; and • *presence and strength of formal protection mechanisms currently in place.*		
Risk of loss with offset %	3%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the presence*** *of any formal protection and/or management over a foreseeable time period (20 years). This is the background rates of loss.*	Risk of loss with offset estimated to be 3% because a protection mechanism is likely to extinguish risk of further clearing to expand agricultural capacity of the land or increase carrying capacity for livestock. However, a conservation covenant is unlikely to completely remove risks due to residual factors such as illegal clearing, natural disasters such as fires, and uncontrolled access by livestock or ferals and edge impacts due to proximity of land use.	Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'.
Confidence in result % (averted loss)	95%	*This is the confidence in the strength and effectiveness of the protection mechanism.*	Confidence in averted loss is set at 95% assuming there is a very high level of protection afforded by the conservation agreement.	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'.
Confidence in result % (change in habitat quality)	50%	*This is the confidence in the effectiveness of the proposed improvement measures.*	Confidence in quality is 50% as trees and shrubs will be planted; ongoing management under a biodiversity management plan will increase the chances of success. Understorey is presently in moderate to good condition and has a good opportunity to recover through assisted natural regeneration. Rehabilitation measures, such as exclusion fencing and buffer planting are likely to protect the vegetation from ongoing edge impacts and allow it to establish.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss. EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package. Anglo has a track record of restoration success at Dartbrook with the River Red Gum Restoration project: Dartbrook River Red Gum

				Restoration Project (Anglo Coal 2008, Anglo Coal (Dartbrook Management) Pty Ltd 2010). Spring 2009 Monitoring of River Red Gum (*Eucalyptus camaldulensis*) at Dartbrook Mine, Hunter Valley (Umwelt (Australia) Pty Limited 2010). Native Understorey Species Regeneration at NSW Coal Mines. Final Report (Gillespie *et al.* 2001). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008).
Cost ($ total)		*The overall cost of the proposed offsets package; including costs associated with, but not limited to:* • *acquisition and transfer of lands/property;* • *implementation of all related management actions; and* • *monitoring, reporting and auditing of offset performance.*		

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EPBC OFFSET ASSESSMENT - ASSUMPTIONS, RATIONALES AND SOURCE REFERENCES

Project Number: **EPBC 2011/5911**

MNES Matter: **(Condition C) White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland**

Value in calculation	Score				Explanation	Rationale	Source
IMPACTS: Loss of 74 ha of Existing Remnant Box Gum Woodland							
Area of community on impact site (ha)	74 ha						Drayton South Coal Project Ecology Impact Assessment (EIA) (Cumberland Ecology 2012): Chapter 7 (Table 7.1).
Weighting allocation to quality (applies to both impact and offset quality scores)	Context	Condition	Stocking rate	TOTAL	*Context: connectivity values, importance of site in relation to overall spp. population or community, threats nearby?* *Condition: structure, diversity, presence of habitat features, resilience.* *Spp. Stocking rate: presence of species on site, density, importance of population on site in relation to overall population.*	The weighting is shared equally between <u>condition</u> and <u>context</u> because condition and landscape factors such as connectivity and patch size are important influences of viability of the community. <u>Stocking rate</u> are not applicable to vegetation communities and has been assigned zero weighting.	Commonwealth Listing Advice on White Box-Yellow Box-Blakelyi's Red Gum Grassy Woodland and Derived Native Grassland; Point 4 regarding Condition Classes (Threatened Species Scientific Committee 2006).
	50%	50%	0%	100%			
Quality of impact site	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the site.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10)*	<u>Context:</u> the areas of woodland are relatively large in total area but are currently not well connected to other areas offsite. Patches fragmented although close together. <u>Condition:</u> mature regrowth. No old growth trees. Understorey is moderately diverse in areas but is subject to seasonal weediness.	EIA (Cumberland Ecology 2012): Chapter 5 'Description of the vegetation'.
	5	7	0	**6**			
OFFSETS – Part 1: Protection and Improvement of 794 ha of Existing Box Gum Woodland							
Area of community on offset properties (ha)	794 ha				*List the properties that these remnants are located on.*	**Offsite Offset:** 774 ha **Onsite Offsets:** 20 ha	EIA (Cumberland Ecology 2012): Chapter 10 (Table 10.7).

Current quality of offset site(s)	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the offset.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: Vegetation along Saddlers Creek is still patchy at the moment but vegetation on Offsite Offset is substantial and is connected to large areas of remnant vegetation in neighbouring properties. Although it does not connect directly to existing NPs, it is indirectly connected – can be considered a substantial stepping stone. Condition: Vegetation along Saddlers Creek is still patchy at the moment but vegetation on Offsite Offset is in moderate to good condition with diverse understoreys and showing evidence of natural regeneration.	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'
	6	7	0	**7**			
Future quality of offset site(s) without offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset without protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: no change expected. Surrounding properties are not expected to undergo change in land use that would remove the remnant vegetation. Condition: vegetation expected to decline under current management practices. Cattle grazing still accessing downstream reaches of Saddlers Creek. Slashing, ringbarking and maintenance of pastures currently taking place on Offsite Offset. Weeds like Sweet Briar could become a problem. St John's Wort a known problem in the district.	EIA (Cumberland Ecology 2012): Chapter 5 (description of vegetation condition), Chapter 7 (description of impacts) and Chapter 10 (description of the offsite offsets).
	6	6	0	**6**			
Future quality of offset site(s) with offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset with protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: slight improvement in connectivity to offsite remnant vegetation because of restoration works along Saddlers Creek. Will also improve quality of stream flowing into the Hunter River. Condition: Will improve under improvement and management works, such as weeding, feral control and grazing management. Cessation of ringbarking and slashing activities will allow vegetation to naturally regenerate.	EIA (Cumberland Ecology 2012): Chapter 9 (description of the BOP) and Chapter 10 (description of the offsite offsets). A Guide to Native Pasture Management (DPI (VIC) n.d). A Guide to Managing Box Gum Grassy Woodlands (Rawlings *et al.* 2010). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008).
	7	8	0	**8**			
Time horizon (years)	20 years				*Time over which loss is averted, the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified. The*	The life of the mine is more than 20 years – a large proportion of restoration and rehabilitation will be well advanced after this time.	EIA (Cumberland Ecology 2012): Section 1.1 'Project Description'.

		number entered into this cell should be the duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.		
Time until ecological benefit	10 years	*The time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matters.*	Time to ecological benefit is likely to be 10 years before protective management (such as fencing, weeding etc) and supplementary buffer planting will likely result in visible improvements in quality of the patch.	Residual Matters Report, Boggabri Coal; Section 2.7.2 and Section 2.7.3 (Parsons Brinckerhoff Australia Pty Ltd 2011).
Risk of loss without offset %	20%	*The risk of damage, degradation or destruction to any proposed offset site(s) **in the absence** of any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on:* • *presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent;* • *average risk of loss for similar sites; and* • *presence and strength of formal protection mechanisms currently in place.*	Risk of loss without offset is estimated to be 20% because the proposed offsets are located in a valuable farming area and are in zones of active farming. There are no formal protection mechanisms in place to protect the vegetation from some permitted types of clearing or other agricultural activities under the current 1(a) Agricultural zoning. There is a potential risk of loss if landowners opt to increase their grazing operations and clear areas of their property that are currently used for light grazing; however, it is impossible to say how likely this will be to occur within the next 20 years.	This estimate is based upon Cumberland Ecology research in the locality and the observed rate of clearing and disturbance to unreserved farmland/grazing lands that has been occurring.
Risk of loss with offset %	3%	*The risk of damage, degradation or destruction to any proposed offset site(s) **in the presence** of any formal protection and/or management over a foreseeable time period (20 years). This is the background rates of loss.*	Risk of loss with offset estimated to be 3% because a protection mechanism is likely to extinguish risk of further clearing to expand agricultural capacity of the land or increase carrying capacity for livestock. However, a conservation covenant is unlikely to completely remove risks due to residual factors such as illegal clearing, natural disasters such as fires, and uncontrolled access by livestock or ferals and edge impacts due to proximity of land use.	As above, this estimate is based upon the nature and extent of woodland regeneration in areas protected from grazing.
Confidence	95%	*This is the confidence in the*	Confidence in averted loss is set at 95% assuming	This is based upon observations by

in result % (averted loss)					*strength and effectiveness of the protection mechanism.*	there is a very high level of protection afforded by the conservation agreement.	Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss.
Confidence in result % (change in habitat quality)	80%				*This is the confidence in the effectiveness of the proposed improvement measures.*	Confidence in quality is 80% as restoration measures, such as exclusion fencing, supplementary planting and buffer planting is likely to protect the vegetation from ongoing edge impacts and allow it to recover.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss.
Cost ($ total)					*The overall cost of the proposed offsets package; including costs associated with, but not limited to:* • *acquisition and transfer of lands/property;* • *implementation of all related management actions; and* • *monitoring, reporting and auditing of offset performance.*		
OFFSETS – Part 2: Protection, Rehabilitation and Maintenance of Native Pasture to Condition C Box Gum Woodland							
Area of community on offset properties (ha)	62 ha				*List the properties that these remnants are located on.*	62 ha Onsite within Saddlers Creek Restoration.	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package'.
Current quality of	Context	Condition	Stocking rate	**TOTAL (weighting**	*Current quality of the offset.* *Score each attribute out of 10 and*	Context: Does not provide connected woodland or forest habitat in its current form, but has potential	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset

offset site(s)				**applied)**	*then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	to become well connected vegetation, since it has some connectivity offsite by virtue of the inherent corridor values of the creekline environment. Condition: Is still native pasture and contains native species; however, diversity does not meet the EPBC Condition Criteria	Package'.
	5	3	0	**4**			
Future quality of offset site(s) without offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset without protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: no change expected. Surrounding properties are not expected to undergo change in land use that would remove the existing remnant vegetation. Condition: vegetation expected to decline under current management practices. Cattle grazing still accessing downstream reaches of Saddlers Creek.	EIA (Cumberland Ecology 2012): Chapter 5 (description of vegetation condition), Chapter 7 (description of impacts).
	5	2	0	**4**			
Future quality of offset site(s) with offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset with protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: Will increase the connectivity to offsite remnant vegetation because of restoration works along Saddlers Creek. Will also improve quality of stream flowing into the Hunter River. Condition: Will improve under improvement and management works, such as weeding, feral control and grazing management. Cessation of ringbarking and slashing activities will allow vegetation to naturally regenerate.	EIA (Cumberland Ecology 2012): Chapter 9 (description of the BOP) and Chapter 10 (description of the offsite offsets). A Guide to Native Pasture Management (DPI (VIC) n.d). A Guide to Managing Box Gum Grassy Woodlands (Rawlings *et al.* 2010). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008).
	6	5	0	**6**			
Time horizon (years)	20 years				*Time over which loss is averted, the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified. The number entered into this cell should be the duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.*	The life of the mine is more than 20 years – a large proportion of restoration and rehabilitation will be well advanced after this time.	EIA (Cumberland Ecology 2012): Section 1.1 'Project Description'.
Time until ecological benefit	15 years				*The time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matters.*	Time to ecological benefit can potentially take 15 years before the trees and shrubs mature and the understorey approaches minimum benchmark values.	Residual Matters Report, Boggabri Coal; Section 2.7.2 and Section 2.7.3 (Parsons Brinckerhoff Australia Pty Ltd 2011).

Risk of loss without offset %	25%	*The risk of damage, degradation or destruction to any proposed offset site(s) **in the absence** of any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on:* • *presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent;* • *average risk of loss for similar sites; and* • *presence and strength of formal protection mechanisms currently in place.*	Risk of loss without offset is estimated to be 25% because the proposed offsets are located in a valuable farming area and are in zones of active farming. There are no formal protection mechanisms in place to protect the vegetation from some permitted types of clearing or other agricultural activities under the current 1(a) Agricultural zoning. There is a potential risk of loss if landowners opt to increase their stocking rates substantially above current stocking rates - unsure how likely this would be over next 20 years.	EIA (Cumberland Ecology 2012): Chapter 7 'Impact Assessment', Chapter 8 'Impact mitigation' and Chapter 9 'Biodiversity Offset Package'.
Risk of loss with offset %	3%	*The risk of damage, degradation or destruction to any proposed offset site(s) **in the presence** of any formal protection and/or management over a foreseeable time period (20 years). This is the background rates of loss.*	Risk of loss with offset estimated to be 3% because a protection mechanism is likely to extinguish risk of further clearing to expand agricultural capacity of the land or increase carrying capacity for livestock. However, a conservation covenant is unlikely to completely remove risks due to residual factors such as illegal clearing, natural disasters such as fires, and uncontrolled access by livestock or ferals and edge impacts due to proximity of land use.	Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'.
Confidence in result % (averted loss)	95%	*This is the confidence in the strength and effectiveness of the protection mechanism.*	Confidence in averted loss is set at 95% assuming there is a very high level of protection afforded by the conservation agreement.	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package. Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'.
Confidence in result % (change in habitat	50%	*This is the confidence in the effectiveness of the proposed improvement measures.*	Confidence in quality is 50% as trees and shrubs will be planted; ongoing management under a biodiversity management plan will increase the chances of success.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock

quality)			Understorey is presently in moderate to good condition and has a good opportunity to recover through assisted natural regeneration. Rehabilitation measures, such as exclusion fencing and buffer planting are likely to protect the vegetation from ongoing edge impacts and allow it to establish.	grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss. EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package. Anglo has a track record of restoration success at Dartbrook with the River Red Gum Restoration project: Dartbrook River Red Gum Restoration Project (Anglo Coal 2008, Anglo Coal (Dartbrook Management) Pty Ltd 2010). Spring 2009 Monitoring of River Red Gum (*Eucalyptus camaldulensis*) at Dartbrook Mine, Hunter Valley (Umwelt (Australia) Pty Limited 2010). Native Understorey Species Regeneration at NSW Coal Mines. Final Report (Gillespie *et al.* 2001). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008).
Cost ($ total)		*The overall cost of the proposed offsets package; including costs associated with, but not limited to:* • *acquisition and transfer of lands/property;* • *implementation of all related management actions; and* • *monitoring, reporting and auditing of offset performance.*		

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EPBC OFFSET ASSESSMENT - ASSUMPTIONS, RATIONALES AND SOURCE REFERENCES

Project Number: **EPBC 2011/5911**

MNES Matter: **Swift Parrot (*Lathamus discolor)***

Value in calculation	Score				Explanation	Rationale	Source
IMPACTS: Loss of 389 ha of Existing Foraging Habitat							
Area of threatened species habitat on impact site (ha)	389 ha					Forest and woodland vegetation that provides known and potential forage habitat for the species. The species was recorded foraging in woodland habitat during surveys of the impact area in 2011.	Drayton South Coal Project Ecology Impact Assessment (EIA) (Cumberland Ecology 2012): Section 6.2.2 *xi* 'Threatened Fauna Species', Section 7.3 'Summary of Direct Impacts to MNES' and Appendix I.12 'Swift Parrot Seven-part test'.
Weighting allocation to quality (applies to both impact and offset quality scores)	Context	Condition	Stocking rate	TOTAL	*Context: connectivity values, importance of site in relation to overall spp. population or community, threats nearby?* *Condition: structure, diversity, presence of habitat features, resilience.* *Spp. Stocking rate: presence of species on site, density, importance of population on site in relation to overall population.*	Condition and context have been weighted equally because condition (health of vegetation and ability to support or produce important forage resources) and the availability of stepping stone habitat in over cleared landscapes are important for the migratory species. Stocking rate has not been weighted as highly as the species is likely to forage infrequently and in low densities during its migratory movements on the mainland.	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results' and Chapter 6 'Fauna Results'. National Recovery Plan for the Swift Parrot (*Lathamus discolor*) (2011).
	45	45	10%	100%			
Quality of threatened species habitat on impact site	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the site.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10)*	Context: largely cleared Hunter Valley floor with patchy areas of foraging habitat. Not known to be a primary foraging area, although migratory pathways are still poorly understood. However, provides a relatively well-connected 'stepping stone' corridor on the otherwise cleared Hunter Valley floor; could be locally important in periods of poor flowering or during drought. Condition: presence of mature trees that reliably provide forage resources (lerps, winter-flowering Eucalypts, mistletoes) for the species. However, contains few key	EIA (Cumberland Ecology 2012): Chapters 5 'Flora Results' and 6 'Fauna Results'. National Recovery Plan for the Swift Parrot (*Lathamus discolor*) (2011).
	6	6	2	**6**			

Value in calculation	Score				Explanation	Rationale	Source
						food trees such as *E. sideroxylon, E. albens, E. melliodora* and *Corymbia maculata*. Habitat has been historically cleared for agricultural purposes and remnant patches are typically fragmented and not extensive. Stocking rate: the species is expected to occur infrequently and in very low densities to forage in the locality during migratory movements.	
OFFSETS – Part 1: Protection and Improvement of 1290 ha of Existing Foraging Habitat							
Area of threatened species habitat on offset properties (ha)	1290				*List the properties that these remnants are located on.*	**Offsite Offset:** 1181 ha **Onsite Offsets:** 109 ha - Existing treed habitat along Saddlers Creek: 24 ha - Existing habitat to be retained along the primary ridgeline: 85 ha	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'.
Current quality of threatened species habitat on offset site(s)	Context 7	Condition 6	Stocking rate 2	**TOTAL (weighting applied)** **6**	*Current quality of the offset.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: largely cleared Hunter Valley floor with patchy areas of foraging habitat. Not known to be a primary foraging area, although migratory pathways are still poorly understood. However, provides a relatively well-connected 'stepping stone' corridor; could be locally important in periods of poor flowering or during drought. Vegetation on offsite offset forms part of the Liverpool Ranges. Condition: presence of mature trees that reliably provide forage resources (lerps, winter-flowering Eucalypts, mistletoes) for the species. Offsite offset contains some key food trees such *as E. albens* and *E. melliodora*, *E. tereticornis, E. blakelyi*. Relatively intact woodland on slopes. Onsite woodland is highly fragmented and is not extensive but still contain mature trees. Some competition from aggressive pest species likely.	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'.

Value in calculation	Score				Explanation	Rationale	Source
						Stocking rate: the species is expected to occur infrequently and in very low densities to forage in the locality during migratory movements.	
Future quality of threatened species habitat at the offset site(s) without offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset without protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: largely cleared Hunter Valley floor with patchy areas of foraging habitat. Not known to be a primary foraging area, although migratory pathways are still poorly understood. However, provides a relatively well-connected 'stepping stone' corridor; could be locally important in periods of poor flowering or during drought. Vegetation on offsite offset forms part of the Liverpool Ranges. Condition: Without protection, the condition of offset vegetation may continue to decline, due to decreasing patch size and increased competition from aggressive pest species that typify disturbed landscapes. Onsite offset has high potential to be impacted from surrounding mine without management. Stocking Rate: the species is expected to occur infrequently and in very low densities to forage in the locality during migratory movements.	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'. Also based on observations of current clearing and ringbarking practices to maintain grazing land for livestock.
	7	4	1	**5**			
Future quality of threatened species habitat at the offset site(s) with offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset with protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: Vegetation on offsite offset forms part of the Liverpool Ranges and improving the habitat will make the foraging habitat more valuable. Some improvement in local corridors because of restoration works along Saddlers Creek (which connects to Hunter River). Condition: Will improve under improvement and management works, such as weeding, feral control and grazing management. Cessation of ringbarking and slashing activities will allow vegetation to naturally regenerate. This will increase patch size,	EIA (Cumberland Ecology 2012): Appendix I.12 'Swift Parrot Seven-part test'. Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'. National Recovery Plan for the Swift Parrot (*Lathamus discolor*) (SEWPaC 2011). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008).
	7	8	2	**7**			

Value in calculation	Score	Explanation	Rationale	Source
			resilience, structural diversity and abundance of foraging resources. Stocking rate: the species is expected to occur infrequently and in very low densities to forage in the locality during migratory movements.	Managing and Conserving Grassy Woodlands (McIntyre *et al.* 2002) A Guide to Managing Box Gum Grassy Woodlands (Rawlings *et al.* 2010).
Time horizon (years)	20 years	*Time over which loss is averted, the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified. The number entered into this cell should be the duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.*	The life of the mine is more than 20 years. Existing habitat in the offset areas will provide immediate habitat for the species. A large proportion of restoration and rehabilitation will be well advanced after this time.	EIA (Cumberland Ecology 2012): Section 1.1 'Project Description'.
Time until ecological benefit	Immediate and ongoing	*The time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matters.*	Time to ecological benefit of existing remnant vegetation in the offset areas is immediately (i.e. time = 0) as mature habitat already exists and currently provides foraging habitat for the species.	EIA (Cumberland Ecology 2012): Chapter 6 'Fauna Results'. Swift Parrots found in impact area, which contains similar quality habitat to offset areas. Therefore the habitat is known to be suitable for the species.
Risk of loss without offset %	20%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the absence*** *of any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on:* • *presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent;* • *average risk of loss for similar sites; and* • *presence and strength of formal protection*	Risk of loss of habitat for the species without formal protection of the offsets is estimated to be 20%. The existing offsets are located in valuable grazing areas. There are currently no formal protection mechanisms in place to protect the habitat from degradation by cattle, weeds feral animals, clearing or other agricultural activities. Without protection, there is no guarantee that portions of the Onsite Offsets to be retained will not be mined in the future. There is also a potential risk of loss if landowners opt to increase their grazing operations and further clear areas of their property that are currently used for light grazing; however, it is impossible to say	This estimate is based upon Cumberland Ecology research in the locality and the observed rate of clearing and disturbance to unreserved farmland/grazing lands that has been occurring.

Value in calculation	Score	Explanation	Rationale	Source
		mechanisms currently in place.	how likely this will be to occur within the next 20 years.	
Risk of loss with offset %	3%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the presence*** *of any formal protection and/or management over a foreseeable time period (20 years). This is the background rates of loss.*	Risk of loss with offset estimated to be 3% because a protection mechanism is likely to extinguish risk of further clearing to expand the mining or agricultural capacity of the offsets. A conservation covenant is unlikely to completely remove risks due to residual factors such as natural disasters like drought, fires, uncontrolled access by livestock or feral animals and edge impacts due to proximity of land use.	As above, this estimate is based upon the nature and extent of woodland regeneration in areas protected from grazing.
Confidence in result % (averted loss)	95%	*This is the confidence in the strength and effectiveness of the protection mechanism.*	Confidence in averted loss is set at 95% assuming there is a very high level of protection afforded by the conservation agreement for the offset areas.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss.
Confidence in result % (change in habitat quality)	80%	*This is the confidence in the effectiveness of the proposed improvement measures.*	Confidence in quality is 80% as restoration measures, such as exclusion fencing, supplementary planting and buffer planting is likely to protect the vegetation from ongoing edge impacts and allow it to recover.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss.
Cost ($ total)		*The overall cost of the proposed offsets package; including costs associated with, but not limited to:* • *acquisition and transfer of lands/property;*		

Value in calculation	Score				Explanation	Rationale	Source
					• *implementation of all related management actions; and* • *monitoring, reporting and auditing of offset performance.*		
OFFSETS – Part 2: Restoration of 960 ha of native pastures to woodland and forest habitat							
Area of threatened species habitat on offset properties (ha)	960 ha				*List the properties that these remnants are located on.*	Represents offset areas that will be subject to restoration of grassland to woodland. Does not include mine rehabilitation: **Offsite Offset:** 898 ha **Onsite Offsets:** 62 ha	EIA (Cumberland Ecology 2012): Chapter 8 'Impact Mitigation', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'.
Current quality of threatened species habitat on offset site(s)	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the offset.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: largely cleared Hunter Valley floor with patchy areas of foraging habitat. Not known to be a primary foraging area, although migratory pathways are still poorly understood. Condition: 0 as habitat is currently low diversity grassland and not suitable forage habitat for the species Stocking rate: 0; in its current form, this habitat will not support individuals that may forage in the region during migratory movements	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'.
	3	0	0	**1**			
Future quality of threatened species habitat at the offset site(s) without offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset without protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: largely cleared Hunter Valley floor with patchy areas of foraging habitat. Not known to be a primary foraging area, although migratory pathways are still poorly understood. Condition: Without protection, no change to grassland. 0 as habitat is currently low diversity grassland and not suitable forage habitat for the species. Stocking rate: 0; in its current form, this habitat will not support individuals that may forage in the region during migratory movements	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'.
	3	0	0	**1**			

Value in calculation	Score				Explanation	Rationale	Source
Future quality of threatened species habitat at the offset site(s) with offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset with protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: improvement in connectivity to offsite remnant vegetation because of restoration works along Saddlers Creek, which will connect to Hunter River. Offsite offset forms part of the Liverpool Ranges – creating additional foraging habitat will augment existing patches. Condition: Will improve following restoration and rehabilitation works as low diversity grassland is turned into woodland. Grassland restoration in offsite offset area will create substantial patches of vegetation that will increase foraging resources. Stocking rate: the species is expected to occur infrequently and in very low densities to forage in the locality during migratory movements.	EIA (Cumberland Ecology 2012): Appendix I.12 'Swift Parrot Seven-part test'. Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'. National Recovery Plan for the Swift Parrot (*Lathamus discolor*) (SEWPaC 2011). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008). Managing and Conserving Grassy Woodlands (McIntyre *et al.* 2002). A Guide to Managing Box Gum Grassy Woodlands (Rawlings *et al.* 2010).
	4	3	2	**3**			
Time horizon (years)	20 years				*Time over which loss is averted, the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified. The number entered into this cell should be the duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.*	The life of the mine is more than 20 years – a large proportion of restoration and rehabilitation will be well advanced after this time	EIA (Cumberland Ecology 2012): Section 1.1 'Project Description'.
Time until ecological benefit	15 years				*The time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matters.*	May take at least 15 years before the planted trees and shrubs reach reproductive maturity and produce reliable and abundance blossom resources. May take more than 15 years longer trees are sufficiently mature to support mistletoes. Some studies report first flowering after 1-4 years depending on the species. Some industry examples have demonstrated that native bird use of rehabilitated mine sites can be observed within 10 years.	Eucalypt Ecology: Individuals to Ecosystems (Williams and Woinarski 1997). Seed fall and flowering in white box (*Eucalyptus albens* Benth.) trees near Cowra, New South Wales (Semple *et al.* 2007). Strong, independent, quantitative genetic control of the timing of vegetative phase change and first flowering in *Eucalyptus globulus* ssp.

Value in calculation	Score	Explanation	Rationale	Source
			We have conservatively estimated 15 years for trees to achieve substantial size and reach maturity (and hence flower reliably).	Globulus (Jordan *et al.* 1999). Residual Matters Report, Boggabri Coal; Section 2.7.2 and Section 2.7.3 (Parsons Brinckerhoff Australia Pty Ltd 2011).
Risk of loss without offset %	10%	*The risk of damage, degradation or destruction to any proposed offset site(s) **in the absence** of any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on:* • *presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent;* • *average risk of loss for similar sites; and* • *presence and strength of formal protection mechanisms currently in place.*	Risk of loss of habitat for the species without formal protection of the offsets is estimated to be 10%. The offsets to be restored are located in relatively valuable agriculture areas and are currently grazed. This regime is likely to continue without offset and contribute to cumulative grazing impacts.	EIA (Cumberland Ecology 2012): Chapter 7 'Impact Assessment', Chapter 8 'Impact mitigation' and Chapter 9 'Biodiversity Offset Package'.
Risk of loss with offset %	3%	*The risk of damage, degradation or destruction to any proposed offset site(s) **in the presence** of any formal protection and/or management over a foreseeable time period (20 years). This is the background rates of loss.*	Risk of loss with offset estimated to be 3% because a protection mechanism is likely to extinguish risk of further clearing and allow ongoing rehabilitation and restoration works. A conservation covenant is unlikely to completely remove risks due to residual factors such as natural disasters like drought, fires, uncontrolled access by livestock or feral animals and edge impacts due to proximity of land use.	Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'.
Confidence in result % (averted loss)	95%	*This is the confidence in the strength and effectiveness of the protection mechanism.*	Confidence in averted loss is set at 95% assuming there is a very high level of protection afforded by the conservation	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package.

Value in calculation	Score	Explanation	Rationale	Source
			agreement for the offsets.	Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'.
Confidence in result % (change in habitat quality)	50%	*This is the confidence in the effectiveness of the proposed improvement measures.*	Confidence in quality is 50% as trees and shrubs will be planted; ongoing management will increase the chances of success. Grassland has a good opportunity to recover through assisted natural regeneration and planned restoration works along Saddlers Creek and the offsite offset. Exclusion fencing and buffer planting are likely to protect the vegetation from ongoing edge impacts and allow it to establish.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss. EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package. Anglo has a track record of restoration success at Dartbrook with the River Red Gum Restoration project: Dartbrook River Red Gum Restoration Project (Anglo Coal 2008, Anglo Coal (Dartbrook Management) Pty Ltd 2010). Spring 2009 Monitoring of River Red Gum (*Eucalyptus camaldulensis*) at Dartbrook Mine, Hunter Valley (Umwelt (Australia) Pty Limited 2010). Native Understorey Species Regeneration at NSW Coal Mines. Final Report (Gillespie *et al.* 2001). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008).
Cost ($ total)		*The overall cost of the proposed offsets package; including costs associated with, but not limited to:* • *acquisition and transfer of lands/property;*		

Value in calculation	Score	Explanation	Rationale	Source
		• *implementation of all related management actions; and* • *monitoring, reporting and auditing of offset performance.*		

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EPBC OFFSET ASSESSMENT - ASSUMPTIONS, RATIONALES AND SOURCE REFERENCES

Project Number: **EPBC 2011/5911**

MNES Matter: **Regent Honeyeater (*Anthochaera phrygia)***

Value in calculation	Score				Explanation	Rationale	Source
IMPACTS: Loss of 389 ha of Existing Foraging Habitat							
Area of threatened species habitat on impact site (ha)	389 ha					Forest and woodland vegetation that provides potential forage habitat for the Regent Honeyeater. The species has previously been recorded in the Mt Arthur Coal Mine Lease; it has not been recorded during surveys of the impact area..	Drayton South Coal Project Ecology Impact Assessment (EIA) (Cumberland Ecology 2012): Section 6.2.2 *xi* 'Threatened Fauna Species', Section 7.3 'Summary of Direct Impacts to MNES' and Appendix I.11 'Regent Honeyeater Seven-part test'.
Weighting allocation to quality (applies to both impact and offset quality scores)	Context	Condition	Stocking rate	TOTAL	*Context: connectivity values, importance of site in relation to overall spp. population or community, threats nearby?* *Condition: structure, diversity, presence of habitat features, resilience.* *Spp. Stocking rate: presence of species on site, density, importance of population on site in relation to overall population.*	Condition and context have been weighted equally because condition (health of vegetation and ability to support or produce important forage resources) and the availability of stepping stone habitat in over cleared landscapes are important for the migratory species. Stocking rate has not been weighted as highly as the species is likely to forage infrequently and in low densities during its migratory movements on the mainland.	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results' and Chapter 6 'Fauna Results'. DRAFT National Recovery Plan for the Regent Honeyeater *Anthochaera phrygia* (Ingwersen *et al.* 2013).
	45	45	10%	100%			
Quality of threatened species habitat on impact site	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the site.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10)*	Context: largely cleared Hunter Valley floor with patchy areas of foraging habitat. Not known to be a primary foraging area, although migratory pathways are still poorly understood. However, provides a relatively well-connected 'stepping stone' corridor on the otherwise cleared Hunter Valley floor; could be locally important in periods of poor flowering or during drought. Condition: presence of mature trees that reliably provide forage resources (lerps, winter-flowering Eucalypts, mistletoes) for the species. However, contains few key	EIA (Cumberland Ecology 2012): Chapters 5 'Flora Results' and 6 'Fauna Results'. DRAFT National Recovery Plan for the Regent Honeyeater *Anthochaera phrygia* (Ingwersen *et al.* 2013).
	6	6	2	**6**			

Value in calculation	Score				Explanation	Rationale	Source
						food trees such as *E. sideroxylon, E. albens, E. melliodora* and *Corymbia maculata*. Habitat has been historically cleared for agricultural purposes and remnant patches are typically fragmented and not extensive. Stocking rate: the species is expected to occur infrequently and in very low densities to forage in the locality during migratory movements.	
OFFSETS – Part 1: Protection and Improvement of 1290 ha of Existing Foraging Habitat							
Area of threatened species habitat on offset properties (ha)	1290				*List the properties that these remnants are located on.*	**Offsite Offset:** 1181 ha **Onsite Offsets:** 109 ha - Existing treed habitat along Saddlers Creek: 24 ha - Existing habitat to be retained along the primary ridgeline: 85 ha	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property
Current quality of threatened species habitat on offset site(s)	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the offset.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: largely cleared Hunter Valley floor with patchy areas of foraging habitat. Not known to be a primary foraging area, although migratory pathways are still poorly understood. However, provides a relatively well-connected 'stepping stone' corridor; could be locally important in periods of poor flowering or during drought. Vegetation on offsite offset forms part of the Liverpool Ranges. Condition: presence of mature trees that reliably provide forage resources (lerps, winter-flowering Eucalypts, mistletoes) for the species. Offsite offset contains some key food trees such *as E. albens* and *E. melliodora*, *E. tereticornis, E blakelyi*. Relatively intact woodland on slopes. Onsite woodland is highly fragmented and is not extensive but still contain mature trees. Some competition from aggressive pest species likely.	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'
	7	6	2	**6**			

Value in calculation	Score				Explanation	Rationale	Source
						Stocking rate: the species is expected to occur infrequently and in very low densities to forage in the locality during migratory movements.	
Future quality of threatened species habitat at the offset site(s) without offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset without protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: largely cleared Hunter Valley floor with patchy areas of foraging habitat. Not known to be a primary foraging area, although migratory pathways are still poorly understood. However, provides a relatively well-connected 'stepping stone' corridor; could be locally important in periods of poor flowering or during drought. Vegetation on offsite offset forms part of the Liverpool Ranges. Condition: Without protection, the condition of offset vegetation may continue to decline, due to decreasing patch size and increased competition from aggressive pest species that typify disturbed landscapes. Onsite offset has high potential to be impacted from surrounding mine without management. Stocking rate: the species is expected to occur infrequently and in very low densities to forage in the locality during migratory movements.	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property' Also based on observations of current clearing and ringbarking practices to maintain grazing land for livestock.
	7	4	1	**5**			
Future quality of threatened species habitat at the offset site(s) with offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset with protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: Vegetation on offsite offset forms part of the Liverpool Ranges and improving the habitat will make the foraging habitat more valuable. Some improvement in local corridors because of restoration works along Saddlers Creek (which connects to Hunter River). Condition: Will improve under improvement and management works, such as weeding, feral control and grazing management. Cessation of ringbarking and slashing activities will allow vegetation to naturally regenerate. This will increase patch size,	EIA (Cumberland Ecology 2012): Appendix I.11 'Regent Honeyeater Seven-part test'. Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets' DRAFT National Recovery Plan for the Regent Honeyeater *Anthochaera phrygia* (Ingwersen *et al.* 2013). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008)
	7	8	2	**7**			

Value in calculation	Score	Explanation	Rationale	Source
			resilience, structural diversity and abundance of foraging resources. Stocking rate: the species is expected to occur infrequently and in very low densities to forage in the locality during migratory movements.	Managing and Conserving Grassy Woodlands (McIntyre *et al.* 2002) A Guide to Managing Box Gum Grassy Woodlands (Rawlings *et al.* 2010)
Time horizon (years)	20 years	*Time over which loss is averted, the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified. The number entered into this cell should be the duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.*	The life of the mine is more than 20 years. Existing habitat in the offset areas will provide immediate habitat for the species. A large proportion of restoration and rehabilitation will be well advanced after this time.	EIA (Cumberland Ecology 2012): Section 1.1 'Project Description'
Time until ecological benefit	Immediate and ongoing	*The time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matters.*	Time to ecological benefit of existing remnant vegetation in the offset areas is immediately (i.e. time = 0) as mature habitat already exists and currently provides foraging habitat for the species.	EIA (Cumberland Ecology 2012): Chapter 6 'Fauna Results' Although Regent Honeyeaters have not been recorded, the Swift Parrot (which has a very similar ecology), was found in impact area, which contains similar quality habitat to offset areas. Therefore the habitat is likely to be suitable for the species.
Risk of loss without offset %	20%	*The risk of damage, degradation or destruction to any proposed offset site(s) **in the absence** of any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on:* • *presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent;* • *average risk of loss for similar*	Risk of loss of habitat for the species without formal protection of the offsets is estimated to be 20%. The existing offsets are located in valuable grazing areas. There are currently no formal protection mechanisms in place to protect the habitat from degradation by cattle, weeds feral animals, clearing or other agricultural activities. Without protection, there is no guarantee that portions of the Onsite Offsets to be retained will not be mined in the future. There is also a potential risk of loss if landowners opt to increase their grazing	This estimate is based upon Cumberland Ecology research in the locality and the observed rate of clearing and disturbance to unreserved farmland/grazing lands that has been occurring.

Value in calculation	Score	Explanation	Rationale	Source
		sites; and • *presence and strength of formal protection mechanisms currently in place.*	operations and further clear areas of their property that are currently used for light grazing; however, it is impossible to say how likely this will be to occur within the next 20 years.	
Risk of loss with offset %	3%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the presence*** *of any formal protection and/or management over a foreseeable time period (20 years). This is the background rates of loss.*	Risk of loss with offset estimated to be 3% because a protection mechanism is likely to extinguish risk of further clearing to expand the mining or agricultural capacity of the offsets. A conservation covenant is unlikely to completely remove risks due to residual factors such as natural disasters like drought, fires, uncontrolled access by livestock or feral animals and edge impacts due to proximity of land use.	As above, this estimate is based upon the nature and extent of woodland regeneration in areas protected from grazing.
Confidence in result % (averted loss)	95%	*This is the confidence in the strength and effectiveness of the protection mechanism.*	Confidence in averted loss is set at 95% assuming there is a very high level of protection afforded by the conservation agreement for the offset areas.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss.
Confidence in result % (change in habitat quality)	80%	*This is the confidence in the effectiveness of the proposed improvement measures.*	Confidence in quality is 80% as restoration measures, such as exclusion fencing, supplementary planting and buffer planting is likely to protect the vegetation from ongoing edge impacts and allow it to recover.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss.
Cost ($ total)		*The overall cost of the proposed offsets package; including costs*		

Value in calculation	Score				Explanation	Rationale	Source
					associated with, but not limited to: • *acquisition and transfer of lands/property;* • *implementation of all related management actions; and* • *monitoring, reporting and auditing of offset performance.*		
OFFSETS – Part 2: Restoration of 960 ha of native pastures to woodland and forest habitat							
Area of threatened species habitat on offset properties (ha)	960 ha				*List the properties that these remnants are located on.*	Represents offset areas that will be subject to restoration of grassland to woodland. Does not include mine rehabilitation: **Offsite Offset:** 898 ha **Onsite Offsets:** 62 ha	EIA (Cumberland Ecology 2012): Chapter 8 'Impact Mitigation', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'
Current quality of threatened species habitat on offset site(s)	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the offset.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: largely cleared Hunter Valley floor with patchy areas of foraging habitat. Not known to be a primary foraging area, although migratory pathways are still poorly understood. Condition: 0 as habitat is currently low diversity grassland and not suitable forage habitat for the species Stocking rate: 0; in its current form, this habitat will not support individuals that may forage in the region during migratory movements	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'
	3	0	0	**1**			
Future quality of threatened species habitat at the offset site(s) without offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset without protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: largely cleared Hunter Valley floor with patchy areas of foraging habitat. Not known to be a primary foraging area, although migratory pathways are still poorly understood. Condition: Without protection, no change to grassland. 0 as habitat is currently low diversity grassland and not suitable forage habitat for the species. Stocking rate: 0; in its current form, this	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'
	3	0	0	**1**			

Value in calculation	Score				Explanation	Rationale	Source
						habitat will not support individuals that may forage in the region during migratory movements	
Future quality of threatened species habitat at the offset site(s) with offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset with protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: improvement in connectivity to offsite remnant vegetation because of restoration works along Saddlers Creek, which will connect to Hunter River. Offsite offset forms part of the Liverpool Ranges – creating additional foraging habitat will augment existing patches. Condition: Will improve following restoration and rehabilitation works as low diversity grassland is turned into woodland. Grassland restoration in offsite offset area will create substantial patches of vegetation that will increase foraging resources. Stocking rate: the species is expected to occur infrequently and in very low densities to forage in the locality during migratory movements.	EIA (Cumberland Ecology 2012): Appendix I.11 'Regent Honeyeater Seven-part test'. Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets' DRAFT National Recovery Plan for the Regent Honeyeater *Anthochaera phrygia* (Ingwersen *et al.* 2013). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008) Managing and Conserving Grassy Woodlands (McIntyre *et al.* 2002) A Guide to Managing Box Gum Grassy Woodlands (Rawlings *et al.* 2010)
	4	3	2	**3**			
Time horizon (years)	20 years				*Time over which loss is averted, the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified. The number entered into this cell should be the duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.*	The life of the mine is more than 20 years – a large proportion of restoration and rehabilitation will be well advanced after this time	EIA (Cumberland Ecology 2012): Section 1.1 'Project Description'
Time until ecological benefit	15 years				*The time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matters.*	May take at least 15 years before the planted trees and shrubs reach reproductive maturity and produce reliable and abundance blossom resources. May take more than 15 years longer trees are sufficiently mature to support mistletoes. Some studies report first flowering after 1-4 years depending on the species. Some	Eucalypt Ecology: Individuals to Ecosystems (Williams and Woinarski 1997). Seed fall and flowering in white box (*Eucalyptus albens* Benth.) trees near Cowra, New South Wales (Semple *et al.* 2007). Strong, independent, quantitative

Value in calculation	Score	Explanation	Rationale	Source
			industry examples have demonstrated that native bird use of rehabilitated mine sites can be observed within 10 years. We have conservatively estimated 15 years for trees to achieve substantial size and reach maturity (and hence flower reliably).	genetic control of the timing of vegetative phase change and first flowering in *Eucalyptus globulus* ssp. Globulus (Jordan *et al.* 1999). Residual Matters Report, Boggabri Coal; Section 2.7.2 and Section 2.7.3(Parsons Brinckerhoff Australia Pty Ltd 2011).
Risk of loss without offset %	10%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the absence*** *of any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on:* • *presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent;* • *average risk of loss for similar sites; and* • *presence and strength of formal protection mechanisms currently in place.*	Risk of loss of habitat for the species without formal protection of the offsets is estimated to be 10%. The offsets to be restored are located in relatively valuable agriculture areas and are currently grazed. This regime is likely to continue without offset and contribute to cumulative grazing impacts.	EIA (Cumberland Ecology 2012): Chapter 7 'Impact Assessment', Chapter 8 'Impact mitigation' and Chapter 9 'Biodiversity Offset Package'
Risk of loss with offset %	3%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the presence*** *of any formal protection and/or management over a foreseeable time period (20 years). This is the background rates of loss.*	Risk of loss with offset estimated to be 3% because a protection mechanism is likely to extinguish risk of further clearing and allow ongoing rehabilitation and restoration works. A conservation covenant is unlikely to completely remove risks due to residual factors such as natural disasters like drought, fires, uncontrolled access by livestock or feral animals and edge impacts due to proximity of land use.	Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'

Value in calculation	Score	Explanation	Rationale	Source
Confidence in result % (averted loss)	95%	*This is the confidence in the strength and effectiveness of the protection mechanism.*	Confidence in averted loss is set at 95% assuming there is a very high level of protection afforded by the conservation agreement for the offsets.	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'
Confidence in result % (change in habitat quality)	50%	*This is the confidence in the effectiveness of the proposed improvement measures.*	Confidence in quality is 50% as trees and shrubs will be planted; ongoing management will increase the chances of success. Grassland has a good opportunity to recover through assisted natural regeneration and planned restoration works along Saddlers Creek and the offsite offset. Exclusion fencing and buffer planting are likely to protect the vegetation from ongoing edge impacts and allow it to establish.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss. EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package Anglo has a track record of restoration success at Dartbrook with the River Red Gum Restoration project: Dartbrook River Red Gum Restoration Project (Anglo Coal 2008, Anglo Coal (Dartbrook Management) Pty Ltd 2010). Spring 2009 Monitoring of River Red Gum (*Eucalyptus camaldulensis*) at Dartbrook Mine, Hunter Valley (Umwelt (Australia) Pty Limited 2010). Native Understorey Species Regeneration at NSW Coal Mines. Final Report (Gillespie *et al*. 2001). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008).
Cost ($ total)		*The overall cost of the proposed offsets package; including costs*		

Value in calculation	Score	Explanation	Rationale	Source
		associated with, but not limited to: • *acquisition and transfer of lands/property;* • *implementation of all related management actions; and* • *monitoring, reporting and auditing of offset performance.*		

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EPBC OFFSET ASSESSMENT - ASSUMPTIONS, RATIONALES AND SOURCE REFERENCES

Project Number: **EPBC 2011/5911**

MNES Matter: **Greater Long-eared Bat (*Nyctophilus corbeni)***

Value in calculation	Score				Explanation	Rationale	Source
IMPACTS: Loss of 389 ha of Existing Foraging Habitat							
Area of threatened species habitat on impact site (ha)	389 ha					Forest and woodland vegetation that provides known and potential forage habitat for the species. The species was recorded foraging in woodland habitat during surveys of the impact area in 2000.	Drayton South Coal Project Ecology Impact Assessment (EIA) (Cumberland Ecology 2012): Section 6.2.2 *xi* 'Threatened Fauna Species', Section 7.3 'Summary of Direct Impacts to MNES' and Appendix I.31 'Hollow-roosting Microbats Seven-part test'.
Weighting allocation to quality (applies to both impact and offset quality scores)	Context	Condition	Stocking rate	TOTAL	*Context: connectivity values, importance of site in relation to overall spp. population or community, threats nearby?* *Condition: structure, diversity, presence of habitat features, resilience.* *Spp. Stocking rate: presence of species on site, density, importance of population on site in relation to overall population.*	Condition and context have been weighted equally because condition (health of vegetation and ability to support or produce important forage resources) and the availability of stepping stone habitat in over cleared landscapes are important for the species. Stocking rate has not been weighted as highly as the species has a large home range and does not defend foraging areas. Can forage in both large and small numbers. Can roost at a number of different sites and is known to move large distances in one night.	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results' and Chapter 6 'Fauna Results'. Species Profile and Threats Database (SEWPaC 2011).
	45	45	10%	100%			
Quality of threatened species habitat on impact site	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the site.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10)*	Context: species is found in areas such as the Monobalai Nature Reserve and Goulburn River and Wollemi National Parks which is close to impact site. Impact site located in largely cleared Hunter Valley floor with patchy areas of foraging habitat. However, foraging activities are concentrated around patches of trees in the landscape and so this is still well suited	EIA (Cumberland Ecology 2012): Chapters 5 'Flora Results' and 6 'Fauna Results'. Species Profile and Threats Database (SEWPaC 2011).
	7	5	2	**6**			

Value in calculation	Score				Explanation	Rationale	Source
						to the species. Condition: presence of mature canopy within which the species hunts in flight. However, species also hunts among understorey vegetation; the habitat has been historically cleared for agricultural purposes and understorey is not typically dense. Stocking rate: the species has a large foraging range and can travel large distances in one night.	
OFFSETS – Part 1: Protection and Improvement of 1290 ha of Existing Foraging Habitat							
Area of threatened species habitat on offset properties (ha)	1290				*List the properties that these remnants are located on.*	**Offsite Offset:** 1181 ha **Onsite Offsets:** 109 ha - Existing treed habitat along Saddlers Creek: 24 ha - Existing habitat to be retained along the primary ridgeline: 85 ha	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property.
Current quality of threatened species habitat on offset site(s)	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the offset.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: species is found in areas such as the Monobalai Nature Reserve and Goulburn River and Wollemi National Parks which is close to offsets. Offsets located in largely cleared Hunter Valley floor with patchy areas of foraging habitat. However, foraging activities are concentrated around patches of trees in the landscape and so this is still well suited to the species. Vegetation on offsite offset forms part of the Liverpool Ranges. Condition: presence of mature canopy within which the species hunts in flight. Species also hunts among understorey vegetation; on offsite offset, much of the existing woody vegetation supports well-developed understorey vegetation. On the onsite offset areas, the habitat has been historically cleared for agricultural purposes	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'.
	7	6	2	**6**			

Value in calculation	Score				Explanation	Rationale	Source
						and understorey is not typically dense. Stocking rate: the species has a large foraging range and can travel large distances in one night.	
Future quality of threatened species habitat at the offset site(s) without offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset without protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: species is found in areas such as the Monobalai Nature Reserve and Goulburn River and Wollemi National Parks which is close to offsets. Offsets located in largely cleared Hunter Valley floor with patchy areas of foraging habitat. However, foraging activities are concentrated around patches of trees in the landscape and so this is still well suited to the species. Vegetation on offsite offset forms part of the Liverpool Ranges. Condition: Without protection, the condition of offset vegetation may continue to decline, particularly the understorey vegetation. Onsite offset has high potential to be impacted from surrounding mine without management. Stocking rate: the species has a large foraging range and can travel large distances in one night.	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property' Also based on observations of current clearing and ringbarking practices to maintain grazing land for livestock.
	7	4	1	**5**			
Future quality of threatened species habitat at the offset site(s) with offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset with protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	Context: species is found in areas such as the Monobalai Nature Reserve and Goulburn River and Wollemi National Parks which is close to offsets. Improving the offsets will make the foraging habitat more valuable. Some improvement in local corridors because of restoration works along Saddlers Creek (which connects to Hunter River). Condition: Will improve under improvement and management works, such as weeding, feral control and grazing management. Cessation of ringbarking and slashing activities will allow vegetation to naturally regenerate. This will increase patch size,	EIA (Cumberland Ecology 2012): Appendix I.31 'Hollow-roosting Microbats Seven-part test'. Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets' Species Profile and Threats Database (SEWPaC 2011). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008) Managing and Conserving Grassy Woodlands (McIntyre *et al.* 2002) A Guide to Managing Box Gum
	7	8	2	**7**			

Value in calculation	Score	Explanation	Rationale	Source
			resilience, structural diversity and hence quality of foraging and roosting habitat. Stocking rate: the species has a large foraging range and can travel large distances in one night.	Grassy Woodlands (Rawlings *et al.* 2010).
Time horizon (years)	20 years	*Time over which loss is averted, the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified. The number entered into this cell should be the duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.*	The life of the mine is more than 20 years. Existing habitat in the offset areas will provide immediate habitat for the species. A large proportion of restoration and rehabilitation will be well advanced after this time.	EIA (Cumberland Ecology 2012): Section 1.1 'Project Description'.
Time until ecological benefit	Immediate and ongoing	*The time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matters.*	Time to ecological benefit of existing remnant vegetation in the offset areas is immediately (i.e. time = 0) as mature habitat already exists and currently provides foraging habitat for the species.	EIA (Cumberland Ecology 2012): Chapter 6 'Fauna Results' Greater Long-eared Bat found in impact area, which contains similar quality habitat to offset areas. Therefore the habitat is known to be suitable for the species.
Risk of loss without offset %	20%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the absence*** *of any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on:* • *presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent;* • *average risk of loss for similar sites; and* • *presence and strength of formal protection*	Risk of loss of habitat for the species without formal protection of the offsets is estimated to be 20%. The existing offsets are located in valuable grazing areas. There are currently no formal protection mechanisms in place to protect the habitat from degradation by cattle, weeds feral animals, clearing or other agricultural activities. Without protection, there is no guarantee that portions of the Onsite Offsets to be retained will not be mined in the future. There is also a potential risk of loss if landowners opt to increase their grazing operations and further clear areas of their property that are currently used for light grazing; however, it is impossible to say	This estimate is based upon Cumberland Ecology research in the locality and the observed rate of clearing and disturbance to unreserved farmland/grazing lands that has been occurring.

Value in calculation	Score	Explanation	Rationale	Source
		mechanisms currently in place.	how likely this will be to occur within the next 20 years.	
Risk of loss with offset %	3%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the presence*** *of any formal protection and/or management over a foreseeable time period (20 years). This is the background rates of loss.*	Risk of loss with offset estimated to be 3% because a protection mechanism is likely to extinguish risk of further clearing to expand the mining or agricultural capacity of the offsets. A conservation covenant is unlikely to completely remove risks due to residual factors such as natural disasters like drought, fires, uncontrolled access by livestock or feral animals and edge impacts due to proximity of land use.	As above, this estimate is based upon the nature and extent of woodland regeneration in areas protected from grazing.
Confidence in result % (averted loss)	95%	*This is the confidence in the strength and effectiveness of the protection mechanism.*	Confidence in averted loss is set at 95% assuming there is a very high level of protection afforded by the conservation agreement for the offset areas.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss.
Confidence in result % (change in habitat quality)	80%	*This is the confidence in the effectiveness of the proposed improvement measures.*	Confidence in quality is 80% as restoration measures, such as exclusion fencing, supplementary planting and buffer planting is likely to protect the vegetation from ongoing edge impacts and allow it to recover.	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss.
Cost ($ total)		*The overall cost of the proposed offsets package; including costs associated with, but not limited to:* • *acquisition and transfer of lands/property;*		

Value in calculation	Score				Explanation	Rationale	Source
					• *implementation of all related management actions; and* • *monitoring, reporting and auditing of offset performance.*		
OFFSETS – Part 2: Restoration of 960 ha of native pastures to woodland and forest habitat							
Area of threatened species habitat on offset properties (ha)	960 ha				*List the properties that these remnants are located on.*	Represents offset areas that will be subject to restoration of grassland to woodland. Does not include mine rehabilitation: **Offsite Offset:** 898 ha **Onsite Offsets:** 62 ha	EIA (Cumberland Ecology 2012): Chapter 8 'Impact Mitigation', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'.
Current quality of threatened species habitat on offset site(s)	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Current quality of the offset.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	<u>Context:</u> species is found in areas such as the Monobalai Nature Reserve and Goulburn River and Wollemi National Parks which is close to offsets. <u>Condition</u>: 0 as habitat is currently low diversity grassland and not suitable forage habitat for the species <u>Stocking rate</u>: 0; in its current form, this habitat will not support individuals of the species.	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'.
	3	0	0	**1**			
Future quality of threatened species habitat at the offset site(s) without offset	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset without protection.* *Score each attribute out of 10 and then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	<u>Context:</u> species is found in areas such as the Monobalai Nature Reserve and Goulburn River and Wollemi National Parks which is close to offsets. <u>Condition:</u> Without protection, no change to grassland. 0 as habitat is currently low diversity grassland and not suitable forage habitat for the species. <u>Stocking rate</u>: 0; in its current form, this habitat will not support individuals of the species.	EIA (Cumberland Ecology 2012): Chapter 5 'Flora Results', Chapter 6 'Fauna Results', Chapter 9 'Biodiversity Offset Package' and Chapter 10 'Offsite Offset Property'.
	3	0	0	**1**			
Future quality of threatened species habitat	Context	Condition	Stocking rate	**TOTAL (weighting applied)**	*Future quality of the offset with protection.* *Score each attribute out of 10 and*	<u>Context:</u> improvement in connectivity to offsite remnant vegetation because of restoration works along Saddlers Creek,	EIA (Cumberland Ecology 2012): Appendix I.31 'Hollow-roosting Microbats Seven-part test'.

Value in calculation	Score				Explanation	Rationale	Source
at the offset site(s) with offset	4	3	2	**3**	*then multiply through by weighting. Sum of adjusted scores is the quality of the site (should be a score out of 10).*	which will connect to Hunter River. Creating additional foraging habitat will augment existing patches of habitat on the offsets. Condition: Will improve following restoration and rehabilitation works as low diversity grassland is turned into woodland. Grassland restoration in offsite offset area will create substantial patches of vegetation that will increase foraging habitat. Stocking rate: the species has a large foraging range and can travel large distances in one night.	Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets' Species Profile and Threats Database (SEWPaC 2011). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008) Managing and Conserving Grassy Woodlands (McIntyre *et al.* 2002) A Guide to Managing Box Gum Grassy Woodlands (Rawlings *et al.* 2010)
Time horizon (years)	20 years				*Time over which loss is averted, the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified. The number entered into this cell should be the duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.*	The life of the mine is more than 20 years – a large proportion of restoration and rehabilitation will be well advanced after this time	EIA (Cumberland Ecology 2012): Section 1.1 'Project Description'.
Time until ecological benefit	15 years				*The time over which management actions will deliver any proposed improvement or maintenance of habitat quality for the relevant protected matters.*	We have conservatively estimated 15 years for trees to achieve substantial size and reach maturity, and for understorey vegetation to approach benchmark values and thus providing suitable foraging habitat for the species. The development of hollows for roosting is likely to take significantly longer than 20 years to develop naturally. However, artificial roosting habitat can be established to replace existing roosting hollows that will be lost from the impact area.	Residual Matters Report, Boggabri Coal; Section 2.7.2 and Section 2.7.3 (SEWPaC 2011).
Risk of loss without offset %	10%				*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the absence*** *of*	Risk of loss of habitat for the species without formal protection of the offsets is estimated to be 10%.	EIA (Cumberland Ecology 2012): Chapter 7 'Impact Assessment', Chapter 8 'Impact mitigation' and

Value in calculation	Score	Explanation	Rationale	Source
		any formal protection and/or management over a foreseeable time period (20 years). Such risk assessments may be based on: • *presence of pending development applications, mining leases or other activities on or near the proposed offset site(s) that indicate development intent;* • *average risk of loss for similar sites; and* • *presence and strength of formal protection mechanisms currently in place.*	The offsets to be restored are located in relatively valuable agriculture areas and are currently grazed. This regime is likely to continue without offset and contribute to cumulative grazing impacts.	Chapter 9 'Biodiversity Offset Package'.
Risk of loss with offset %	3%	*The risk of damage, degradation or destruction to any proposed offset site(s)* ***in the presence*** *of any formal protection and/or management over a foreseeable time period (20 years). This is the background rates of loss.*	Risk of loss with offset estimated to be 3% because a protection mechanism is likely to extinguish risk of further clearing and allow ongoing rehabilitation and restoration works. A conservation covenant is unlikely to completely remove risks due to residual factors such as natural disasters like drought, fires, uncontrolled access by livestock or feral animals and edge impacts due to proximity of land use.	Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'.
Confidence in result % (averted loss)	95%	*This is the confidence in the strength and effectiveness of the protection mechanism.*	Confidence in averted loss is set at 95% assuming there is a very high level of protection afforded by the conservation agreement for the offsets.	EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package Response to Submission (RTS) (Hansen Bailey, 2013): Section 1.3.2 'Securing Biodiversity Offsets'.
Confidence in result % (change in habitat quality)	50%	*This is the confidence in the effectiveness of the proposed improvement measures.*	Confidence in quality is 50% as trees and shrubs will be planted; ongoing management will increase the chances of success. Grassland has a good opportunity to recover through assisted natural	This is based upon observations by Cumberland Ecology that woodland regeneration is effective and prolific in areas protected from livestock grazing in the locality, without any further

Value in calculation	Score	Explanation	Rationale	Source
			regeneration and planned restoration works along Saddlers Creek and the offsite offset. Exclusion fencing and buffer planting are likely to protect the vegetation from ongoing edge impacts and allow it to establish.	active management. This gives a basis for a high degree of confidence that regeneration in much more actively managed offsets will have a high chance of averting loss. EIA (Cumberland Ecology 2012): Chapter 9 'The Biodiversity Offset Package Anglo has a track record of restoration success at Dartbrook with the River Red Gum Restoration project: Dartbrook River Red Gum Restoration Project (Anglo Coal 2008, Anglo Coal (Dartbrook Management) Pty Ltd 2010). Spring 2009 Monitoring of River Red Gum (*Eucalyptus camaldulensis*) at Dartbrook Mine, Hunter Valley (Umwelt (Australia) Pty Limited 2010). Native Understorey Species Regeneration at NSW Coal Mines. Final Report (Gillespie *et al.* 2001). Biodiversity in the Paddock: a Land Managers Guide (Dorrough *et al.* 2008).
Cost ($ total)		*The overall cost of the proposed offsets package; including costs associated with, but not limited to:* • *acquisition and transfer of lands/property;* • *implementation of all related management actions; and* • *monitoring, reporting and auditing of offset performance.*		

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