

Offset Strategy

COLLECTOR WIND FARM



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1 INTRODUCTION

1.1 BACKGROUND

Avoiding, minimising and mitigating impacts on biodiversity are the best ways to maintain biodiversity, and may be achieved through, planning, design, construction and maintenance processes. The mitigation measures identified within the Biodiversity Assessment (NGH Environmental 2014) and Biodiversity Assessment Addendum (NGH Environmental 2015) for the project have been developed to assist in minimising and mitigating impacts that cannot be avoided. Offsetting is a last resort that is implemented to compensate for residual impacts that cannot be avoided or completely mitigated.

An offset strategy was prepared for the proposed Collector Wind Farm (the project) by NGH Environmental in 2012 which identified a potential offset area and appropriate offset ratios and measures to manage the area for preservation and improvement. It was a commitment of the BA to:

- Finalise an offset plan (in accordance with the Draft Principles for the use of Biodiversity Offsets in NSW) based on the final infrastructure design, prior to construction and in consultation with OEH.

The proponents and authors have consulted closely with OEH, and this has resulted in refinement of the offset strategy. The following revised strategy has been prepared and supersedes the strategy prepared by NGH Environmental in February 2012.

1.2 OBJECTIVES AND SCOPE

The overarching objective of this strategy is to clearly identify the offsets proposed for the project and determine their suitability in meeting the offset requirements of the project. Key changes to this strategy compared to the previous strategy from 2012 are:

- Utilisation of the BioBanking Assessment Methodology (BBAM) to quantify the offset requirement for the project and determine the suitability of proposed offsets.
- Quantification of hollow-bearing trees at the proposed offset site to determine if a suitable offset is achievable for the loss of hollow-bearing trees as a result of the development.

The scope of this strategy includes:

- A description of the methodologies employed and calculation of the credit requirements created by clearing at the development site according to the BBAM
- A description of the methodologies employed and calculation of the credits generated at the proposed offset site according to the BBAM
- The results of hollow-bearing tree surveys conducted at the offset site
- Evaluation of the suitability of the offset site to meet the offset requirements of the project

This advice is preliminary, to inform more detailed development of an offset plan.

2 CREDIT REQUIREMENTS CREATED BY CLEARING AT THE DEVELOPMENT SITE

2.1 METHODS

The Office of Environment and Heritage (OEH) BioBanking Credit Calculator BCC was accessed on 15/07/2015 to determine the offset credit requirement for clearing associated with the proposed works. Vegetation plot data were collected in accordance with the BioBanking Assessment Methodology (BBAM) 2014 Appendix 2 by experienced project botanist Dave Maynard. This includes sampling nested 20m x 50m and 20m x 20m plots. Within these areas ten parameters are scored and entered against their respective vegetation zones. Calculations were undertaken by accredited assessor Dave Maynard (AN144) to understand the likely credit requirement. This section details the key inputs used in the calculations.

2.1.1 Landscape value

One assessment circle set (consisting of a larger 10,000 ha circle and smaller 1,000 ha circle) were constructed to cover the entire study area (**Figure 2-1**). Percent vegetation cover at the landscape scale for each circle was entered as follows:

CMA – Lachlan

Mitchell Landscape – Gunning Hills

IBRA subregion – Murrumbateman - Lachlan

- 1,000 ha before development = 11-15% of assessment circle
- 1,000 ha after development = 11-15% of assessment circle
- 100 ha before development = 11-15% of assessment circle
- 100 ha after development = 11-15% of assessment circle
- Limiting link = >30-100m, not affected by the development

Woody vegetation with overstorey at benchmark, before and after development, midstorey and groundcover at benchmark before and after development. A landscape value score of 12.0 was calculated for the landscape assessment.

2.1.2 Collection of plot data

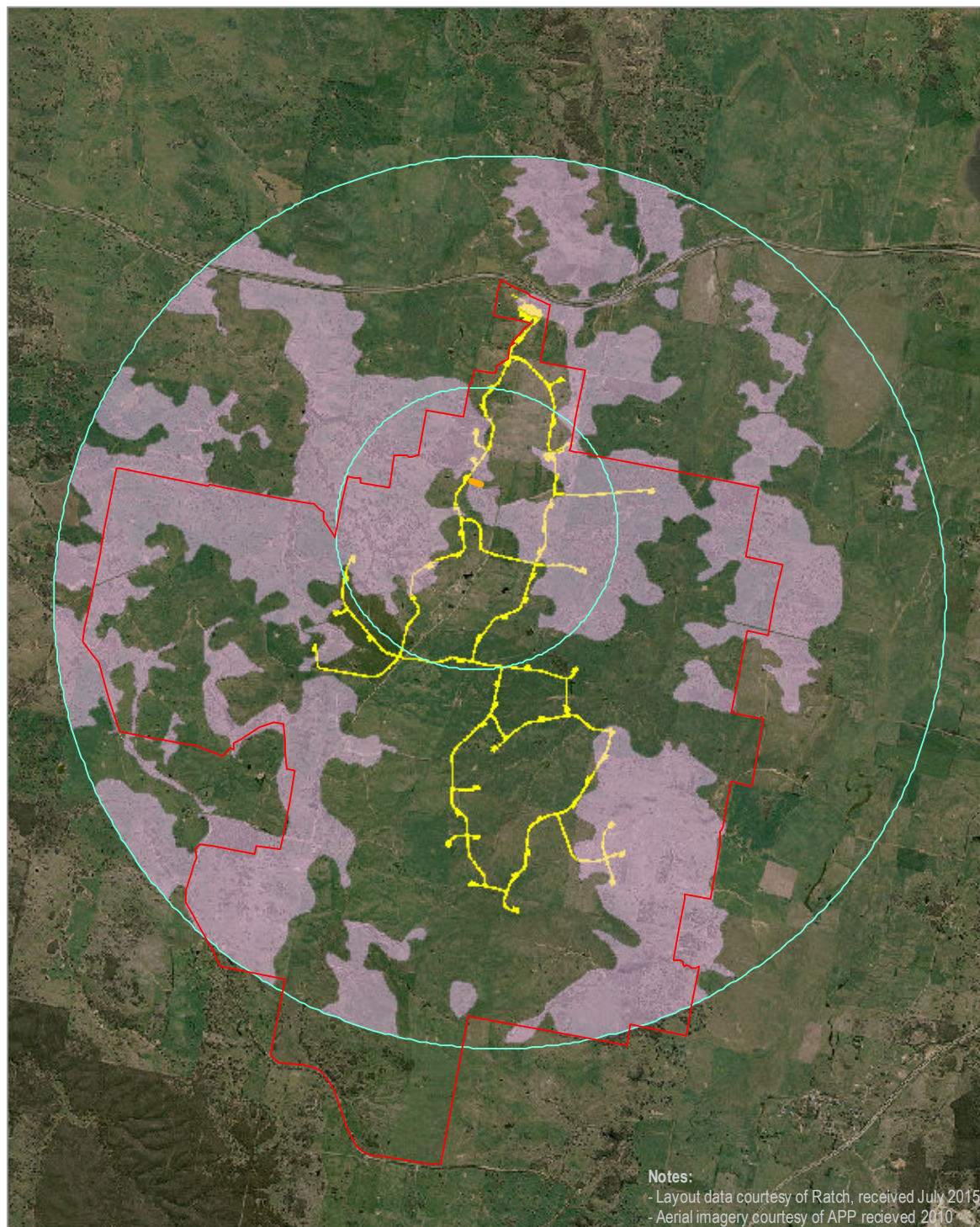
The development site was divided into eight homogenous zones derived from the updated vegetation mapping for the site. The Box-Gum Woodland and derived grassland was divided into four separate zones to account for clear differences in diversity between vegetation in good condition and those in moderate and poor condition.

Based on the modified layout, six of these will be impacted. Although the Brittle Gum – Broad-leaved Peppermint vegetation is impacted, the 0.09 hectare area is below the 0.25 hectare minimum mappable unit. Under the BioBanking rules this is included in the adjacent vegetation zone, Box-Gum Woodland. The areas impacted and the number of plots required by the BBAM is shown in **Table 2-1**. The locations of these plots and the homogenous zones defined for the survey are shown on **Figure 2-2**.

Table 2-1 Homogenous vegetation zones within the development envelope, areas impacted and number of BioBanking plots required.

Homogenous vegetation zone	Condition	Total habitat loss (ha)	Number of plots required
Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120) - Tree cover high diversity	Moderate to good	2.36*	1
Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120) - Tree cover low-moderate diversity	Moderate to good	7.93	3
Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120) - Derived grassland high diversity	Moderate to good	4.43	2
Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120) - Derived grassland low-moderate diversity	Moderate to good	22.23	4
Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion (LA182) – Tree cover	Moderate to good	0.61	1
Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest the NSW South Western Slopes Bioregion (LA182) - Derived grassland	Moderate to good	0.78	1
TOTAL		38.34	12

* This figure includes the 0.09 from the adjacent good condition Brittle Gum – Broad-leaved Peppermint forest as it is below the 0.25 hectare minimum mappable unit. Under the BioBanking rules this is included in the adjacent vegetation zone, which in this case is Box-Gum Woodland.



- Site Boundary
- Proposal footprint
- Development site 1,000ha and 10,000ha assessment circles
- Landscape connectivity
- Limiting link

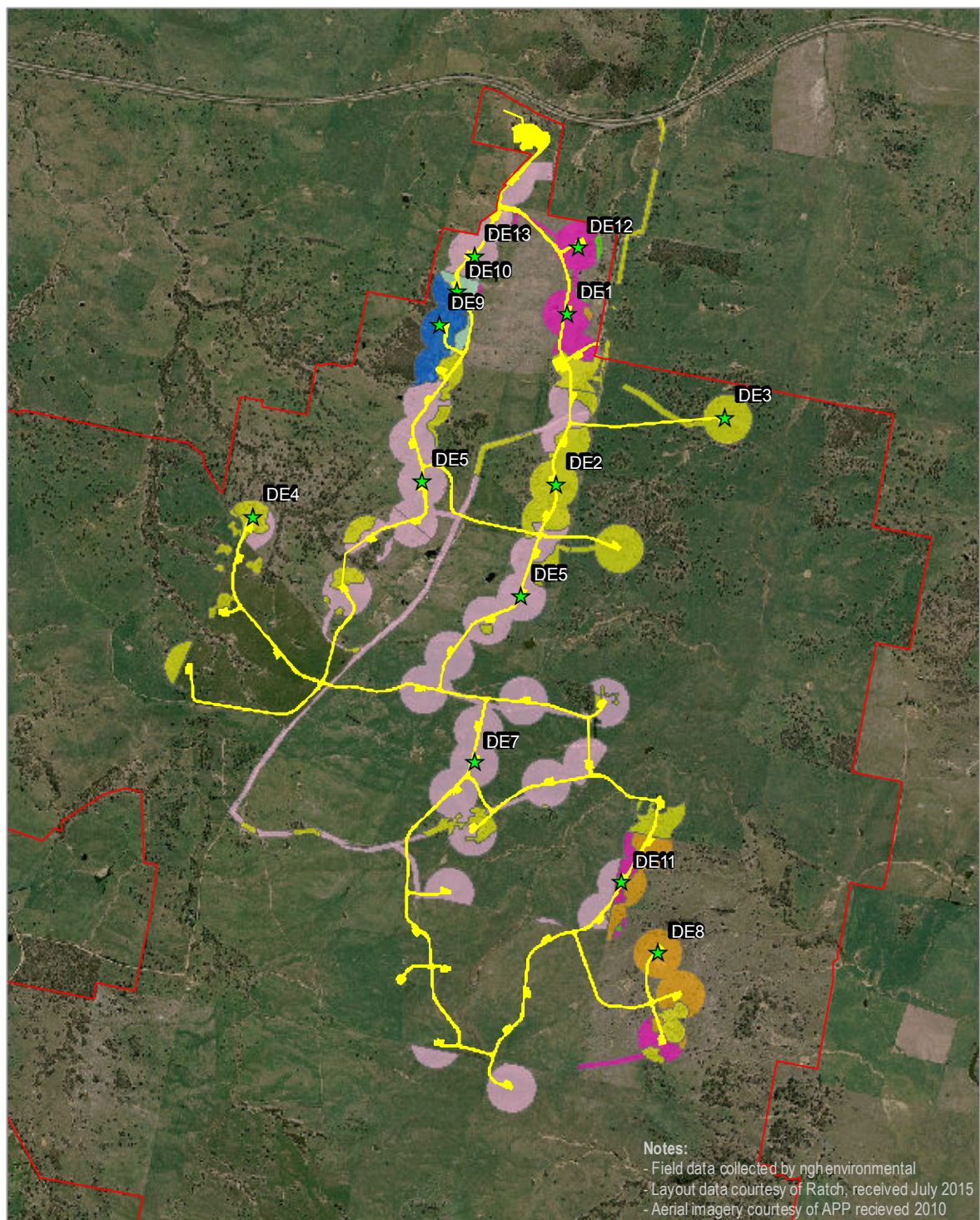
0 0.5 1 2 Kilometres

Ref: 5541 - OS1
Author: DM



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Figure 2-1 Landscape assessment for the development site



- | | |
|---|--|
| <ul style="list-style-type: none"> Site Boundary Development footprint ★ Plot locations | <p>Homogenous vegetation zones</p> <ul style="list-style-type: none"> LA120 - Derived grassland high diversity LA120 - Derived grassland low-moderate diversity LA120 - Tree cover high diversity LA120 - Tree cover low-moderate diversity LA182 - Tree cover LA182 - Derived grassland LA205 - Tree cover |
|---|--|

0 0.5 1 2 Kilomet

Ref: 5541 - OS2
Author: DM



Figure 2-2 Homogenous zones and plot locations at the development site

2.1.3 Threatened species

The species listed in **Table 2-2** below are species identified by the BCC that either require survey or should be assumed to occur. If impacted by the development they would require species credits to be generated by offsetting known habitat. They can be excluded from the assessment by either surveys that have demonstrated that they do not occur within the development site or by an 'expert report' that concludes that the species is unlikely to occur within the development site. The Silky Swanson Pea and Golden Sun Moth were also listed but have been excluded from the assessment as targeted searches for these species did not detect them at the site. We have not conducted targeted surveys for the other species, however, numerous bird surveys were undertaken across the site that failed to detect the Regent Honeyeater despite suitable timing of the surveys. The Biodiversity Assessment for the project concluded that for the remaining species further surveys were not warranted given the low potential for the species to occur and be impacted due to either avoidance of habitat by the proposal or marginal habitat and/or absence of local records. It is proposed to utilise the BA as an 'expert report'. The conclusions of the BA and additional information where relevant is presented in **Table 2-2** below.

Table 2-2 Conclusions regarding the potential for species credit species to occur at the development site

Common name	Conclusions from the BA (nghenvironmental May 2012)	Additional relevant information
Eastern Pygmy-possum	Potential habitat and utilisation of project area? No – ground cover is limited to grass, and in most places this is grazed. There are very few patches of vegetation with a midstorey layer present. There are no records in the local area. Potential to be impacted? No as suitable habitat not present and unlikely to occur.	NA
Golden Sun Moth	Potential habitat and utilisation of project area? Wallaby grass occurs in low to high density (including in association with spear and kangaroo grass) in Box-Gum Woodland including secondary derived grasslands. It also occurs to a less extent in the other vegetation communities in the project area. Potential to be impacted? The BA concluded that there are no or few local records and/or habitat would be marginal and therefore they are not considered likely to occur or to have potential to be impacted by the proposal.	The current known distribution of the Golden Sun Moth occupies an area bounded by Queanbeyan, Gunning, Young and Tumut. The nearest records for this species are approximately 16km south-west of the development site near Gundaroo and these records mark the edge of the known current distribution. Targeted surveys completed when moths were active at other sites did not find any active moths on-site.

Common name	Conclusions from the BA (nghenvironmental May 2012)	Additional relevant information
Koala	Potential habitat and utilisation of project area? Yes – dry forest may provide habitat for this species, although it seems unlikely given the small size and youth of patches. Two records occur in the local area, both in remnant vegetation near the Collector township. Potential to be impacted? The BA concluded that there are no or few local records and/or habitat would be marginal and therefore they are not considered likely to occur or to have potential to be impacted by the proposal.	Records from Collector are in 1996 from a patch of remnant bushland. There is no connectivity between this area and the development site. All other records are in the area are over 25km from the site.
Regent Honeyeater	Potential habitat and utilisation of project area? Yes – key feed species are present in the proposal area in the Box-Gum Woodland vegetation community. There are numerous records of the species, mostly to the west near Mundoonen NR. Potential to be impacted? The BA concluded that this species could possibly occur on the site and could be impacted from habitat loss.	The Regent Honeyeater was not detected during the bird census or utilisation surveys. There are no recent records for this species in the area. Records occur 10km to east (1998) and 12km to the west of the development site (1981). Other nearby records are 20km south-west of the site from 1989. This species is, however, nomadic and was recognised as having potential to occur. The proposal was modified to avoid habitat that may be used by this species in proximity to Lake George.
Rosenberg's Goanna	Potential habitat and utilisation of project area? Yes – However, there are no records for this species in the area. Potential to be impacted? The BA concluded that there are no or few local records and/or habitat would be marginal and therefore they are not considered likely to occur or to have potential to be impacted by the proposal.	Nearest records approximately 35km south of the development site

Common name	Conclusions from the BA (nghenvironmental May 2012)	Additional relevant information
Squirrel Glider	Potential habitat and utilisation of project area? Yes – marginal: areas of dry forest with HBT and regeneration of eucalypts and wattles as a small tree or shrub layer. This occurs to the south-east of Turbine 28 and in the north-east of the project site. Potential to be impacted? Areas identified as having potential to support Squirrel Gliders were mapped and provided to the Proponent as a preliminary constraint to the proposal (December 2009), with a recommendation to avoid such areas and thereby avoid the requirement to undertake target trapping surveys. The approved project avoided these better quality areas and therefore targeted trapping for Squirrel Glider was not considered warranted. Surveys in March and November 2010 evaluated the habitat potential of areas that would be impacted by the proposal. Within those forest and woodland areas, habitat assessments found that the habitat on site was sub optimal for Squirrel Gliders as it contained hollows but lacked an Acacia or shrub mid storey, a feature of preferred habitat for the species (OEH threatened species profile accessed 18/4/11).	Nearest records over 50km east of the development site. No habitat containing regenerating eucalypts and wattles as a small tree or shrub layer will be impacted.

2.2 RESULTS

2.2.1 Credit calculations

The credit requirement generated by this assessment is detailed in Table 2-3 below. The full credit report is provided in Appendix A.

Table 2-3 Credit calculations for the development site

Zone No.	Homogenous vegetation zone	Condition	Total habitat loss (ha)	Ecosystem credits required
1	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120) - Tree cover high diversity	Moderate to good	2.36	113
2	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120) - Tree cover low-moderate diversity	Moderate to good	7.93	190
3	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120) - Derived grassland high diversity	Moderate to good	4.43	111
4	Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120) - Derived grassland low-moderate diversity	Moderate to good	22.23	222
5	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion (LA182) – Tree cover	Moderate to good	0.61	29
6	Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion (LA182) - Derived grassland	Moderate to good	0.78	7
TOTAL			38.34	672

3 EVALUATION OF THE PROPOSED OFFSET SITE

The preferred offset site is located within the project site boundaries on the south-eastern boundary of the proposed wind farm site. In total, the area available for use as an offset is approximately 100ha. An assessment of this broader area has been completed to calculate the credits available however, depending on the number of credits generated, only a portion of the site may actually be required.

3.1 METHODS

The Office of Environment and Heritage (OEH) BioBanking Credit Calculator BCC was accessed on 15/07/2015 to determine the offset credit requirement for clearing associated with the proposed works. Vegetation plot data were collected in accordance with the BioBanking Assessment Methodology (BBAM) 2014 Appendix 2 by experienced project botanist Dave Maynard. This includes sampling nested 20m x 50m and 20m x 20m plots. Within these areas ten parameters are scored and entered against their respective vegetation zones. Calculations were undertaken by accredited assessor Dave Maynard (AN144) to understand the likely credits generated. This section details the key inputs used in the calculations.

3.1.1 Landscape assessment

One assessment circle set (consisting of a larger 1,000 ha circle and smaller 100 ha circle) were constructed to cover the entire proposed offset area (**Figure 3-1**). Percent vegetation cover at the landscape scale for each circle was entered as follows:

CMA – Murrumbidgee

Mitchell Landscape – Gundary Plains

IBRA subregion – Murrumbateman - Murrumbidgee

- 1,000 ha before development = 41-45% of assessment circle
- 1,000 ha after development = 41-45% of assessment circle
- 100 ha before development = 76-80% of assessment circle
- 100 ha after development = 81-85% of assessment circle
- Limiting link = Not applicable. Offset is in a strategic location.

The offset site was identified as being in a strategic location; riparian buffer on both sides of a third order stream (refer to **Figure 3-1**). A landscape value score of 21.20 was calculated for the landscape assessment.



- Proposed offset site
- 1000 and 100 ha assessment circles
- Landscape connectivity
- Watercourses

0 200 400 800 Meters

Ref: 5541 - OS3
Author: DM



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Figure 3-1 Landscape assessment for the proposed offset site

3.1.2 Collection of plot data

The development site was stratified into six homogenous zones during a preliminary stratification survey of the site as shown on **Table 3-1** and mapped on **Figure 3-2**. Eighteen BioBanking plots were required. The locations of plots are shown on **Figure 3-2**.

Table 3-1 Homogenous zones and plot requirements for the proposed offset site

Zone No.	Homogenous vegetation zone	Condition	Total area available (ha)	Number of plots
1	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands (MR648) Tree cover	Moderate to good	63.79	5
2	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands (MR648) - Derived grassland	Moderate to good	16.62	3
3	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest on skeletal hills of the tablelands, South Eastern Highlands (MR595)	Moderate to good	4.23	3
4	Red Stringybark - Broad-leaved Peppermint - Norton's Box tussock grass/heath open forest of the upper Murray River Catchment, NSW South Western Slopes Bioregion (MR 596)	Moderate to good	5.75	3
5	Apple Box - Candlebark - Snow Gum shrubby open forest on valley floors, southern South Eastern Highlands (MR509)	Moderate to good	5.44	3
6	Ribbon Gum - Robertson's Peppermint - Apple Box very tall riparian forest of the NSW South Western Slopes and South East Highlands Bioregions (MR600)	Moderate to good	0.77	1
	TOTAL		96.6	18

3.1.3 Threatened species

The following species credit threatened species were identified as potentially occurring within the habitats at the proposed offset site:

- Booroolong Frog
- Eastern Pygmy-possum
- Koala
- Regent Honeyeater
- Silky Swainson-pea
- Small Purple-pea
- Squirrel Glider
- Striped Legless Lizard

No targeted surveys for threatened species have been completed at the offset site and as no species credits are required for the development, none are planned to be undertaken. None of the above species were entered as being managed at the offset site.

3.1.4 Hollow-bearing tree surveys

Hollow-bearing tree quadrat surveys were conducted at the development site which provided representative samples of the number of trees containing hollows and the size of the hollows within the various habitat types. This information was extrapolated across the broader development and offset site. Previous comments by OEH (letter to the Department of Planning and Infrastructure 20/08/2012) stated that the methodology utilised significantly overestimated the number of hollow-bearing trees that may potentially occur in the offset site. OEH required that an accurate measurement of the hollow-bearing trees in the offset site be undertaken. The following proposed methodology was discussed with OEH on 26 August 2014 and was undertaken at the offset site.

OEH considered that to give an accurate representation a minimum of 10% of the woodland vegetation should be sampled. Five of the Biometric plots that occur within woodland were buffered by 100m to identify hollow-bearing tree sample areas. Each plot would cover approximately 3 ha giving a total of approximately 15 ha sampled out of the 100 ha site (15%). The location of the Biometric plots and proposed hollow-bearing tree plots are shown on **Figure 3-2**. Within each plot all hollow-bearing trees were marked with a GPS and the tree species, DBH, number of hollows, size and description of hollows recorded.

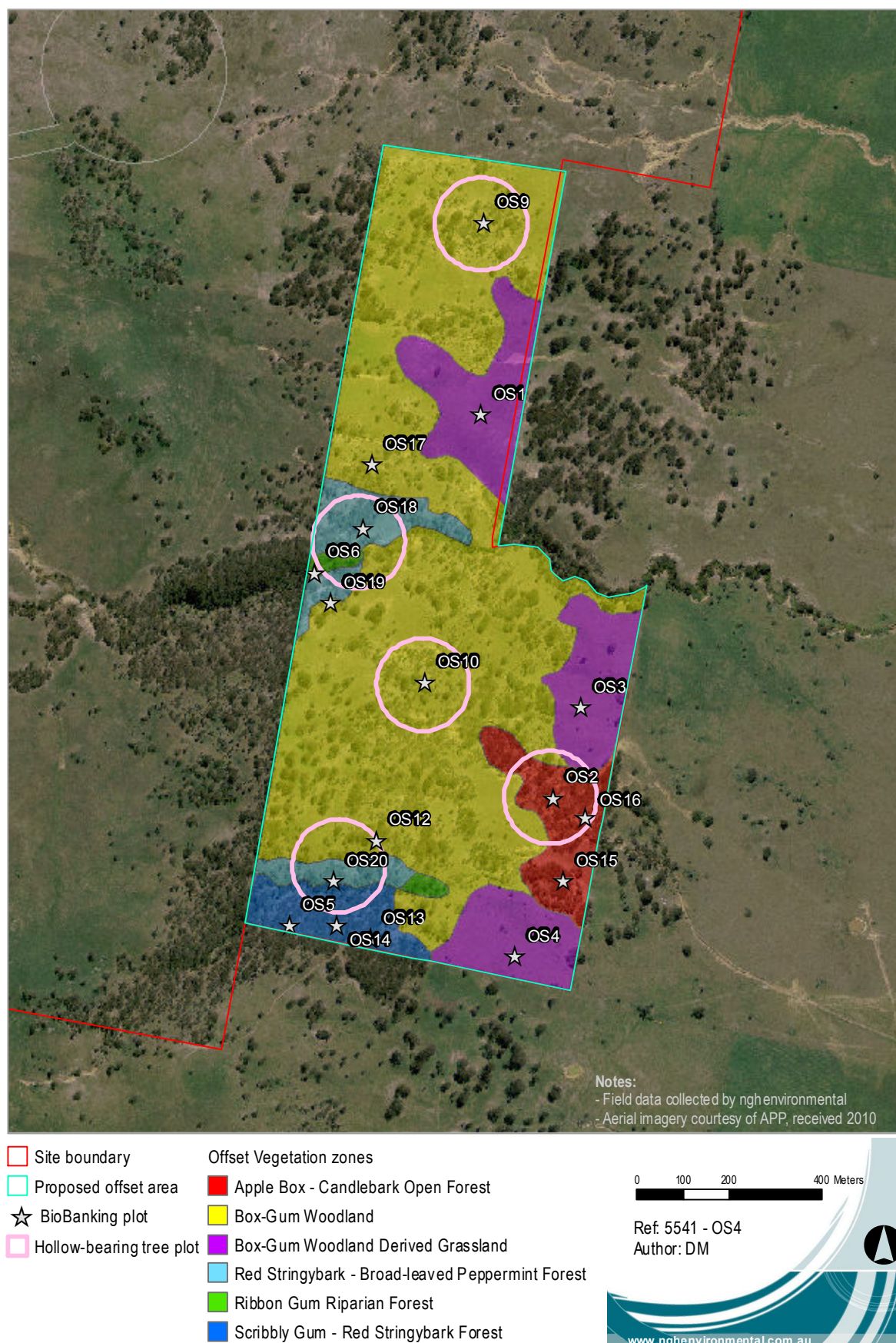


Figure 3-2 Homogenous zones and survey locations at the proposed offset site

3.2 RESULTS

3.2.1 Credit calculations

The credits generated by the assessment as detailed in Table 3-2 below. The full credit report is included in Appendix A.

Table 3-2 Credits generated at the offset site

Zone No.	Homogenous vegetation zone	Condition	Total area available (ha)	Ecosystem credits generated
1	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands (MR648) Tree cover	Moderate to good	63.79	608
2	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands (MR648) - Derived grassland	Moderate to good	16.62	123
3	Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest on skeletal hills of the tablelands, South Eastern Highlands (MR595)	Moderate to good	4.23	42
4	Red Stringybark - Broad-leaved Peppermint - Norton's Box tussock grass/heath open forest of the upper Murray River Catchment, NSW South Western Slopes Bioregion (MR 596)	Moderate to good	5.75	65
5	Apple Box - Candlebark - Snow Gum shrubby open forest on valley floors, southern South Eastern Highlands (MR509)	Moderate to good	5.44	44
6	Ribbon Gum - Robertson's Peppermint - Apple Box very tall riparian forest of the NSW South Western Slopes and South East Highlands Bioregions (MR600)	Moderate to good	0.77	8
	TOTAL		96.6	890

No species credits have been generated at the offset site as targeted surveys for flora did not detect any threatened species and targeted surveys for threatened fauna have not been undertaken.

3.2.2 Hollow-bearing tree surveys

The results of the hollow-bearing tree surveys are summarised in **Table 3-3** below. The estimated number of hollow-bearing trees within the offset site is shown in **Table 3-4**. The raw hollow-bearing tree survey data for the offset site is included as

Table 3-3 Results of the hollow-bearing tree surveys at the offset site

Plot ID	Vegetation type	Area (ha)	No. of HBTs	HBT density/ha
OS2	Apple Box - Candlebark Open Forest	2.25	7	2.8
	Box-Gum Woodland	0.8	0	0
OS9	Box-Gum Woodland	3.14	13	3.8
OS10	Box-Gum Woodland	3.14	9	2.9
OS18	Box-Gum Woodland	0.78	3	3.8
	Red Stringybark - Broad-leaved Peppermint Forest	2.05	17	8.3
	Ribbon Gum Riparian Forest	0.31	1	3.2
OS20	Box-Gum Woodland	1.25	6	4.8
	Red Stringybark - Broad-leaved Peppermint Forest	1.06	2	1.9
	Scribbly Gum - Red Stringybark Forest	0.82	4	4.9

Table 3-4 Estimated number of hollow-bearing trees within the offset site

Vegetation type	Area within offset site (ha)	Average density of HBTs/ha	Estimated number of HBTs in the offset site
Apple Box - Candlebark Open Forest	5.44	2.8	15.2
Box-Gum Woodland	63.79	3.1	197.7
Red Stringybark - Broad-leaved Peppermint Forest	5.75	5.1	29.3
Ribbon Gum Riparian Forest	0.77	3.2	2.5
Scribbly Gum - Red Stringybark Forest	4.23	4.9	20.7
Total			265

Based on the estimated number of 38 hollow-bearing trees to be impacted at the development site, and an estimated 265 hollow-bearing trees within the offset site, this provides an approximate offset ratio of 7:1 for the hollow-bearing trees that may be potentially impacted by the development.

4 CREDIT COMPARISON

A comparison of the credits required by the development and generated at the offset site is provided in **Table 4-1**. The credits required by the development are reasonably low and this is reflective of the general lower quality of the vegetation across the site. The credits generated by the offset site on the other hand are relatively high which is likely to be indicative of the good quality of the vegetation, the mitigated loss in protecting such vegetation and the anticipated increases in site value. Increases in site value were those that are automatically generated by the BCC with no increases in gain applied. The offset site also contains riparian areas on both sides of a third order stream which contributes to the landscape value of the site.

Although the proposed offset site is immediately adjacent to the development site, it occurs just within the border of the Murrumbidgee CMA whereas the majority of the development site is in the Lachlan CMA. As such the vegetation types that were used for the BioBanking assessments are specific to these CMAs and are not directly interchangeable. The BioBanking 2014 methodology provides some flexibility in this regard. According to the BioBanking Methodology 2014, the offset vegetation type needs to be:

- a) the Plant Community Type (PCT) for which the ecosystem credit is required for the impacts of development
- b) any PCT of the same vegetation class as identified in a) that has:
 - a percent cleared value of the PCT in the major catchment area equal to or greater than the percent cleared of the PCT specified in a)
 - or
 - a percent cleared value up to 10% lower than the PCT specified in a), if the percent cleared of the PCT specified in a) is less than or equal to 70% cleared.

With regard to IBRA sub-regions, PCTs that meet the above criteria can be in:

- a) the IBRA subregion in which the development occurs
- b) the adjoining IBRA subregions within the same IBRA region as identified in a)
- c) any other IBRA subregions that immediately adjoin the IBRA subregion identified in a)
- d) any other IBRA subregions that have the same geographic distribution of the threatened species assessed for the ecosystem credits that are required at the development site

Although not identified on the BioBanking Credit report for the development site (refer to Attachment B), the Red Stringybark - Broad-leaved Peppermint - Norton's Box tussock grass/heath open forest at the development site is in the same vegetation class (Upper Riverina Dry Sclerophyll Forests) as the Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest at the development site. This is considered to be an acceptable substitution according to BBAM 2014 given that the substituted vegetation type is of the same class, and meets the percent cleared requirements.

The Yellow Box - Blakely's Red Gum grassy woodland (Southern Tableland Grassy Woodland vegetation class) at the offset site is, however, a different vegetation class to the Blakely's Red Gum - Yellow Box grassy woodland (Western Slopes Grassy Woodlands vegetation class) at the development site. According to the BBAM 2014 these vegetation types are not interchangeable. However, given the geographic proximity of the sites, it is considered that the Box-Gum Woodland vegetation at the development site and offsets site is essentially the same vegetation community or PCT which has been split in this instance due to the location of the CMA boundary which dissects the development site. Part of the development site does in fact occur within the Murrumbidgee CMA just not the bulk of it. Both of the vegetation types are 95%

cleared within their respective CMA's and are considered to be of equal conservation value. They also occur in adjoining IBRA sub-regions.

Table 4-1 Development and offset site credit comparison

Development site vegetation zones	Class	Percent cleared in the CMA	Total habitat loss (ha)	Ecosystem credits required	Offset site vegetation zones	Class	Percent cleared in the CMA	Total area available (ha)	Credits generated	Credit difference
Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120) – Tree cover	Western Slopes Grassy Woodlands	95	7.04	303	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands (MR648) – Tree cover	Southern Tableland Grassy Woodland	95	63.79	608	+305
Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (LA120) – Derived Grassland	Western Slopes Grassy Woodlands	95	20.92	333	Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands (MR648) - Derived grassland	Southern Tableland Grassy Woodland	95	16.62	123	-210
Red Stringybark - Scribbly Gum - Red Box - Long-leaved Box shrub - tussock grass open forest of the NSW South Western Slopes Bioregion (LA182) – Tree cover	Upper Riverina Dry Sclerophyll Forests	25	0.91	36	Red Stringybark - Broad-leaved Peppermint - Norton's Box tussock grass/heath open forest of the upper Murray River Catchment, NSW South Western Slopes Bioregion (MR 596)	Upper Riverina Dry Sclerophyll Forests	15	4.23	42	+6
					Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest on skeletal hills of the tablelands, South Eastern Highlands (MR595)	Southern Tableland Dry Sclerophyll Forests	65	5.75	65	+65
					Apple Box - Candlebark - Snow Gum shrubby open forest on valley floors, southern South Eastern Highlands (MR509)	Tableland Clay Grassy Woodlands	60	5.44	44	+44

Development site vegetation zones	Class	Percent cleared in the CMA	Total habitat loss (ha)	Ecosystem credits required	Offset site vegetation zones	Class	Percent cleared in the CMA	Total area available (ha)	Credits generated	Credit difference
					Ribbon Gum - Robertson's Peppermint - Apple Box very tall riparian forest of the NSW South Western Slopes and South East Highlands Bioregions (MR600)	Southern Tableland Wet Sclerophyll Forests	60	0.77	8	+8
TOTAL			28.87	672				96.6	890	+218

5 SECURITY AND MANAGEMENT

It is proposed to establish a Conservation Property Vegetation Plan in perpetuity over the offset site. The agreement will specify required management measures and restrictions on land use, in accordance with the finalised Biodiversity Offset Plan. Management actions would include as a minimum:

- Establishment and maintenance of fencing
- Weed control
- Feral animal control
- Ongoing monitoring and adaptive management

Ratch already has signed an Agreement For Lease and Easement (AFLE) with the relevant property landowner for this part of the Collector project, which includes a separate section that commits to the establishment of the Property Vegetation Plan for the defined offset area. Ratch would be responsible for the ongoing management costs of the offset site for the operating life of the wind farm.

6 CONCLUSION AND RECOMMENDATIONS

The proposed offset site generates approximately 30% more than the necessary credits that are required by the development according to the BBAM. As such, the proposed offset is considered to be more than adequate to offset impacts to vegetation communities, including EECs and threatened species habitat.

It is estimated that the offset site provides an approximate 5.8:1 offset for hollow-bearing trees impacted by the development. This is considered to be adequate in the context of the approximate 2.5:1 ratio calculated for vegetation and threatened species habitat offsets by the BBAM which reflects the reduced quality of general habitat features at the development site.

The specifics of the offset package will be finalised following final project design (within the defined micro-siting areas) and subject to review as part of the requirements of the existing conditions of consent. A detailed offset package, including a plan of management (and demonstration that funding for management will be available to manage the site in accordance with the plan of management) would be finalised prior to impacts occurring.

APPENDIX A CREDIT REPORTS

A.1 DEVELOPMENT SITE

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

Date of report: 31/07/2015

Time: 2:00:37PM

Calculator version: v4.0

Development details

Proposal ID: 144/2014/1191D

Proposal name: Collector Wind Farm development site

Proposal address: Hume Highway Collector NSW 2581

Proponent name: Ratch Australia Corporation

Proponent address: PO Box 1573 North Sydney NSW 2059

Proponent phone: +61 2 8913 9431

Assessor name: Dave Maynard

Assessor address: PO Box 470 Bega NSW 2550

Assessor phone: (02) 64928311

Assessor accreditation: 144

Improving or maintaining biodiversity

An application for a red flag determination is required for the following red flag areas

Red flag	Reason
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;
Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Vegetation type being > 70% cleared; or it contains an endangered ecological community;

The application for a red flag determination should address the criteria set out in the BioBanking Assessment Methodology. Please note that a biobanking statement cannot be issued unless the determination is approved.

Additional information required for approval:

- ☐ Change to percent cleared for a vegetation type/s
- ☐ Use of local benchmark
- ☐ Change negligible loss
- ☐ Expert report...
- ☒ Request for additional gain in site value
- ☐ Predicted threatened species not on site
- ☐ Change threatened species response to gain (Tg value)

Ecosystem credits summary

Plant Community type	Area (ha)	Credits required	Red flag
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	34.59	523.30	No
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	2.36	113.28	Yes
Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	1.39	36.00	No
Total	38.34	673	

Credit profiles

1. Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion, (LA120)

Number of ecosystem credits created

637

IBRA sub-region

Murrumbateman - Lachlan

Offset options - vegetation types	Offset options - CMA sub-regions
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion, (LA120) White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion, (LA219) Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion, (LA145) Red Box - White Box +/- Red Stringybark hill woodland in the NSW South Western Slopes Bioregion, (LA252)	Murrumbateman - Lachlan and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion, (LA182)

Number of ecosystem credits created

36

IBRA sub-region

Murrumbateman - Lachlan

Offset options - vegetation types	Offset options - CMA sub-regions
Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion, (LA182) Red Stringybark - White Box grassy open forest of the NSW South Western Slopes Bioregion, (LA183) Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion, (LA247) Blakely's Red Gum - Red Stringybark - Long-leaved Box woodland on Wyangala Granite in the NSW South Western Slopes Bioregion, (LA231) Tumbledown Red Gum - Black Cypress Pine - Red Stringybark - Currawang shrubby low woodland on Wyangala granite and metasediments of the Wyangala Dam region, NSW South Western Slopes Bioregion, (LA268) Red Stringybark - red gum - Black Cypress Pine - Kunzea - tea tree shrubby open forest on granite ranges of the Boorowa - Wyangala region, NSW South Western Slopes Bioregion, (LA259) Mugga Ironbark - mixed box woodland on hills in the Cowra - Boorowa - Young region of the NSW South Western Slopes Bioregion, (LA248) Inland Scribbly Gum - Red Stringybark - box - Daviesia latifolia - snow grass open forest on sandy loam soils from acid volcanics in the Boorowa - Young region of the NSW South Western Slopes Bioregion, (LA241)	Murrumbateman - Lachlan and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Species credits summary

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
Golden Sun Moth	Synemon plana	27.96	2,153
Rosenberg's Goanna	Varanus rosenbergi	0.91	30
Eastern Pygmy-possum	Cercartetus nanus	0.91	18
Koala	Phascolarctos cinereus	7.95	207
Squirrel Glider	Petaurus norfolcensis	7.95	175
Regent Honeyeater	Anthochaera phrygia	7.04	542

A.2 OFFSET SITE

BioBanking credit report



Office of
Environment
& Heritage

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

Date of report: 31/07/2015

Time: 2:02:44PM

Calculator version: v4.0

Biobank details

Proposal ID: 144/2014/1458B

Proposal name: Collector Wind Farm offset site

Proposal address: Breadalbane Road Collector NSW 2581

Proponent name: Ratch Corporation Australia

Proponent address: PO Box 1573 North Sydney NSW 2059

Proponent phone: +61 2 8913 9431

Assessor name: Dave Maynard

Assessor address: PO Box 470 Bega NSW 2550

Assessor phone: (02) 64928311

Assessor accreditation: 144

Additional information required for approval:

- ☐ Use of local benchmark
- ☐ Expert report...
- ☐ Request for additional gain in site value

Ecosystem credits summary

Plant Community type	Area (ha)	Credits created
Apple Box - Candlebark - Snow Gum shrubby open forest on valley floors, southern South Eastern Highlands Bioregion	5.44	44.00
Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion	4.23	42.00
Red Stringybark - Broad-leaved Peppermint - Nortons Box heath open forest of the upper slopes subregion in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion	5.75	65.00
Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion	0.77	8.00
Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion	80.41	731.00
Total	96.60	890

Credit profiles

1. Riparian Ribbon Gum - Robertsons Peppermint - Apple Box riverine very tall open forest of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion, (MR600)

Number of ecosystem credits created	8
IBRA sub-region	Murrumbateman - Murrumbidgee

2. Apple Box - Candlebark - Snow Gum shrubby open forest on valley floors, southern South Eastern Highlands Bioregion, (MR509)

Number of ecosystem credits created	44
IBRA sub-region	Murrumbateman - Murrumbidgee

3. Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, (MR648)

Number of ecosystem credits created	731
IBRA sub-region	Murrumbateman - Murrumbidgee

4. Red Stringybark - Broad-leaved Peppermint - Nortons Box heath open forest of the upper slopes subregion in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion, (MR596)

Number of ecosystem credits created	65
IBRA sub-region	Murrumbateman - Murrumbidgee

5. Red Stringybark - Brittle Gum - Inland Scribbly Gum dry open forest of the tablelands, South Eastern Highlands Bioregion, (MR595)

Number of ecosystem credits created	42
IBRA sub-region	Murrumbateman - Murrumbidgee

Species credits summary

Additional management actions

APPENDIX B OFFSET SITE HOLLOW-BEARING TREE DATA

Plot ID	WP	Y	X	Species	no. hollows			DBH (cm)	Height (m)	Condition Live/dead	Evidence of use scratches, whitewash
	740	6137207	720476.8	<i>E. bridgesiana</i>	2	1	1	200	18	Live	
	741	6137193	720426	<i>E. bridgesiana</i>	0	1	0	110	16	Live	
	742	6137322	720460.8	<i>E. bridgesiana</i>	2	0	0	90	12	Live	
HBT 8	743	6137369	720485.3	<i>E. macrorhyncha</i>	0	1	0	80	15	Live	
	747	6137163	720753.2	<i>E. macrorhyncha</i>	1	0	0	60	12	Live	
HBT 2	748	6137152	720744.8	Stag	1	0	2	60	8	Dead	
	750	6136823	720316.6	Stag	0	1	0	50	7	Dead	Scratches
	751	6136871	720268.6	<i>E. macrorhyncha</i>	2	0	0	50	10	Live	
	752	6136951	720308.2	<i>E. macrorhyncha</i>	1	0	1	60	10	Live	
	753	6136950	720398.9	<i>E. bridgesiana</i>	0	0	1	110	16	Live	
	754	6136947	720378.7	<i>E. macrorhyncha</i>	2	0	0	80	16	Live	
HBT 3	755	6136882	720432.2	<i>E. macrorhyncha</i>	1	0	0	110	18	Live	
	757	6136717	720652.2	<i>E. macrorhyncha</i>	0	1	0	65	12	Live	
	758	6136728	720753.6	<i>E. macrorhyncha</i>	2	0	0	70	12	Live	
	759	6136704	720748.9	<i>E. macrorhyncha</i>	1	0	0	70	18	Live	
	760	6136793	720825.3	<i>E. bridgesiana</i>	0	1	0	130	10	Live	
HBT 6	761	6136864	720695.9	<i>E. macrorhyncha</i>	1	0	0	65	13	Live	
	764	6136345	720393.6	<i>E. macrorhyncha</i>	1	1	0	75	14	Live	Worn
	765	6136323	720387.6	<i>E. macrorhyncha</i>	1	0	0	90	12	Live	
	766	6136306	720326.7	<i>E. macrorhyncha</i>	1	0	0	110	10	Live	
	767	6136334	720322.7	Stag	0	1	1	50	10	Dead	
	768	6136364	720321.4	<i>E. macrorhyncha</i>	1	1	1	120	10	Live	
	769	6136393	720295.6	<i>E. macrorhyncha</i>	1	0	1	120	14	Live	
	770	6136447	720345.6	<i>E. macrorhyncha</i>	1	2	0	100	8	Live	
	771	6136395	720334.2	<i>E. macrorhyncha</i>	0	2	0	70	9	Live	
	772	6136386	720367.4	Stag	1	0	1	90	9	Dead	
	773	6136417	720436.6	<i>E. macrorhyncha</i>	2	0	0	60	14	Live	
	774	6136389	720427.7	<i>E. macrorhyncha</i>	0	2	0	100	16	Live	
HBT 4	775	6136367	720434.4	Stag	0	0	2	110	6	Dead	

Plot ID	WP	Y	X	Species	no. hollows			DBH (cm)	Height (m)	Condition Live/dead	Evidence of use scratches, whitewash
	776	6136368	720464.8	<i>E. macrorhyncha</i>	0	1	1	80	8	Live	
	778	6135776	720175.7	<i>E. macrorhyncha</i>	0	1	0	75	10	Live	
	779	6135758	720163.9	<i>E. macrorhyncha</i>	0	1	0	80	10	Live	
	780	6135759	720131.8	<i>E. macrorhyncha</i>	3	0	0	70	14	Live	
	781	6135768	720055.9	<i>E. macrorhyncha</i>	1	0	0	90	14	Live	
	782	6135725	720070.6	<i>E. macrorhyncha</i>	1	1	0	50	10	Live	
	783	6135711	720038.2	<i>E. macrorhyncha</i>	1	0	0	95	14	Live	
	784	6135678	720042	<i>E. macrorhyncha</i>	1	0	0	30	12	Live	Worn
	785	6135697	720056.3	<i>E. macrorhyncha</i>	0	1	0	50	8	Live	
	786	6135693	720064.4	<i>E. macrorhyncha</i>	1	0	0	80	16	Live	
	787	6135675	720076.2	<i>E. macrorhyncha</i>	2	0	0	60	14	Live	
	788	6135704	720125.7	<i>E. macrorhyncha</i>	0	1	0	50	8	Live	
	789	6135676	720124.5	<i>E. viminalis</i>	1	0	0	180	18	Live	
	790	6135668	720125.3	<i>E. viminalis</i>	0	1	1	210	18	Live	
	791	6135664	720111.3	<i>E. viminalis</i>	1	0	1	150	18	Live	
	792	6135616	720079.7	<i>E. viminalis</i>	0	0	1	240	16	Live	
	793	6135591	720108.4	<i>E. macrorhyncha</i>	0	0	1	110	12	Live	
	794	6135600	720106.8	<i>E. macrorhyncha</i>	0	1	0	60	12	Live	
	795	6135614	720104.4	<i>E. macrorhyncha</i>	0	1	0	60	14	Live	Feathers around hollow
	796	6135629	720124	<i>E. macrorhyncha</i>	2	0	0	80	12	Live	
	797	6135660	720203.9	<i>E. macrorhyncha</i>	1	0	0	55	8	Live	
	798	6135663	720183.3	<i>E. macrorhyncha</i>	0	1	0	70	8	Live	
	799	6135685	720193.9	<i>E. dives</i>	2	0	0	60	12	Live	
HBT1	800	6135716	720230.3	<i>E. macrorhyncha</i>	3	0	0	80	12	Live	
	806	6135385	720272.1	<i>E. macrorhyncha</i>	0	1	0	80	14	Live	
	807	6135408	720242.7	<i>E. macrorhyncha</i>	1	0	0	100	16	Live	
	809	6135300	720213.8	<i>E. macrorhyncha</i>	2	0	0	70	12	Live	
	810	6135300	720273.9	<i>E. Melliodora</i>	0	1	0	60	16	Live	
HBT5	811	6135364	720317.6	<i>E. macrorhyncha</i>	1	0	0	90	12	Live	

Plot ID	WP	Y	X	Species	no. hollows			DBH (cm)	Height (m)	Condition Live/dead	Evidence of use scratches, whitewash
HBT7	812	6135349	720364.6	<i>E. macrorhyncha</i>	s	m	l	70	16	Live	
	813	6135446	720281.3	<i>E. viminalis</i>	0	1	0	80	18	Live	
	814	6135407	720213.3	<i>E. macrorhyncha</i>	0	1	0	90	12	Live	
	815	6135389	720208.2	<i>E. macrorhyncha</i>	1	0	0	70	13	Live	
	817	6135072	720152.4	<i>E. macrorhyncha</i>	2	0	0	80	12	Live	
	818	6135062	720143.5	<i>E. macrorhyncha</i>	1	0	0	90	16	Live	
	819	6135060	720117.8	<i>E. macrorhyncha</i>	3	0	0	100	16	Live	Worn
	820	6135081	720050.4	<i>E. macrorhyncha</i>	0	0	2	90	12	Live	Worn
	821	6135054	720055.7	<i>E. macrorhyncha</i>	2	0	0	120	12	Live	
	822	6135053	720080.2	<i>E. macrorhyncha</i>	0	0	1	120	14	Live	
	823	6134970	720099	<i>E. macrorhyncha</i>	1	0	0	60	16	Live	Worn
	824	6134946	720006.6	Stag	0	1	0	45	6	Dead	
	825	6134939	720012.7	<i>E. macrorhyncha</i>	1	0	0	50	10	Live	Worn
	826	6134909	720057.4	<i>E. dives</i>	0	1	0	60	6	Live	
	827	6134948	720100.4	<i>E. macrorhyncha</i>	1	0	0	50	16	Live	
	828	6134976	720146.6	Stag	0	0	2	200	12	Dead	
	836	6135226	720498	Stag	3	0	0	60	6	Dead	
	837	6135171	720642.1	Stag	0	2	3	220	6	Dead	
	838	6135162	720602.7	Stag	2	2	1	120	5	Dead	
	839	6135169	720593.2	Stag	2	1	0	170	12	Dead	
	840	6135161	720590.4	<i>E. rubida</i>	3	1	0	160	14	Live	
	841	6135099	720650.2	<i>E. rubida</i>	0	2	2	120	16	Live	
	842	6135102	720561.3	<i>E. rubida</i>	3	0	0	120	16	Live	
	843	6135060	720553.3	<i>E. bridgesiana</i>	0	0	1	140	12	Live	
HBT9					Sev						
	847	6135315	719816.3	<i>E. macrorhyncha</i>	eral	0	1	70	10	Live	
	848	6135296	719805.7	<i>E. macrorhyncha</i>	1	0	0	60	8	Live	
	849	6135314	719893.6	<i>E. macrorhyncha</i>	1	0	0	80	16	Live	
HBT10	850	6135344	719908.1	<i>E. macrorhyncha</i>	1	0	0	80	14	Live	

Plot ID	WP	Y	X	Species	no. hollows			DBH (cm)	Height (m)	Condition Live/dead	Evidence of use scratches, whitewash
	851	6135430	719822.8	<i>E. macrorhyncha</i>	s	m	l				
					1	1	0	90	14	Dead	
	852	6135418	719753.9	<i>E. macrorhyncha</i>	2	2	0	90	12	Live	
	855	6135334	719765.1	<i>E. macrorhyncha</i>	1	1	0	70	12	Dead	
	856	6135324	719766.4	<i>E. macrorhyncha</i>	1	0	0	40	14	Dead	