

Appendix N – Offset site report



Nature Conservation Trust
Biodiversity offset site
Realignment of the Olympic Highway at Kapooka including
new road-over-rail bridge

November 2013

Glossary of terms

Project definitions

Development	The area of impact included in the BioBanking calculations presented in this report. Comprises the mapped area of native vegetation within the project development footprint.
Development site	The area of direct disturbance for construction of the project.
Offset site	A parcel of land about 40 kilometres east of the development site, in Wagga Wagga NSW that has been set aside for conservation to offset biodiversity impacts arising from the development. This area of land will be included in a conservation covenant.
Subject site	The site for the project; the proposed realignment of the Olympic Highway at Kapooka including the reconstruction of the bridge and ancillary features associated with the project.

BioBanking definitions

Biobank site	Land that is designated by a biobanking agreement to be a biobank site.
Biobanking agreement	An agreement entered into between the landowner and the Minister under Part 7A of the TSC Act for establishing a biobank site.
BioBanking Assessment Methodology (BBAM) (the methodology)	The rules of the BioBanking Scheme established under the TSC Act that determine credits created, credits required and the circumstances that improve or maintain biodiversity values.
BioBanking Credit Calculator (the calculator)	The software component of the BioBanking Assessment Methodology that calculates the credits created or credits required.
BioBanking Credit Calculator (the credit calculator)	The credit calculator is the software component of the methodology. It is a database that contains threatened species, habitat and vegetation data. The credit calculator determines the number of ecosystem credits and species credits required at a development site and the number of ecosystem credits and species credits created at a biobank site. It does this on the basis of the existing biodiversity data, equations, information collected at the site and GIS calculations according to the assessment process outlined in the methodology.
BioBanking Scheme (BioBanking; the scheme)	The biodiversity banking and offsets scheme established under Part 7A of the TSC Act.
BioBanking Trust Fund	Means the BioBanking Trust Fund established under Part 7A of the TSC Act to hold funds from the sale of credits.
Biodiversity credit	Registered biodiversity credits are created for management actions that have been carried out or are proposed to be carried out, in

accordance with the biobanking agreement.

Biodiversity offsets	Actions put in place to counterbalance (offset) an impact on biodiversity values.
Biodiversity values	The composition, structure and function of ecosystems including threatened species, populations and ecological communities, and their habitats.
Development site	Land that is designated by a BioBanking statement to be a development site.
Ecosystem credit	A credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
Management action	An action or proposed action in respect of which a biodiversity credit may be created.
The development footprint	The portion of the subject site that is proposed for development.

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1. Introduction

1.1 Overview

GHD was commissioned by Roads and Maritime Services (RMS) (the proponent) to oversee the provision of biodiversity offsets for the proposed realignment of the Olympic Highway and road-over-rail bridge at Kapooka, New South Wales (the project). The project involves the construction of a new four lane bridge and the realignment of 2.7 kilometres of the Olympic Highway over the Great Southern Railway at Kapooka. The proposed bridge would be located about 460 metres north of the existing bridge and would improve the Olympic Highway and Camp Access Road intersection.

The project is being assessed under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and will result in impacts on native biota. The ecological assessment found that the project is likely to result in significant impacts on a NSW and Commonwealth listed threatened ecological community, Box-Gum Woodland. The potential impacts on threatened species and communities have been identified, along with proposed measures to avoid and mitigate these impacts (GHD 2012).

A Species Impact Statement (SIS) is being prepared based on the Director General's Requirements (DGRs), dated 13 December 2013, due to the significant impact the project will have on an ecological communities listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act).

A referral was submitted to the then Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) for the project. It was determined to be a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 30 August 2013, based on the likely significant impact to listed threatened species and communities and the environment of Commonwealth land. The project will require assessment and approval under the EPBC Act before it can proceed via the preparation of preliminary documentation.

Biodiversity offsets are required to compensate for residual impacts on threatened ecological communities, species and their habitats, and clearing of native vegetation. A biodiversity offset comprises one or more appropriate actions that are put in place to counterbalance specific impacts on native biota and their habitats. Appropriate actions are considered to be long-term management activities that aim to improve biodiversity conservation. This can include legal protection of land (i.e. an offset site) to ensure security of management actions and removal of threats (DECC 2008a).

This biodiversity offset strategy has been prepared by GHD to provide biodiversity offsets to compensate for impacts arising from the project on threatened species and ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Threatened Species Conservation Act 1995* (TSC Act).

The offset strategy for the project would comprise the conservation and management of an offset site referred to as the biodiversity offset site, which would be conserved under a conservation land title covenant under the *Nature Conservation Trust Act 2001* (NCT Act).

1.2 Objectives

The overall objectives of this biodiversity offset strategy are to:

- Summarise the ecological impacts of the project, specifically the impacts on biodiversity values that require offsetting.

- Satisfy the requirements of the NSW Office of Environment and Heritage (OEH) and Commonwealth Department of the Environment (DoE), formally the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).
- Demonstrate how the impacts of the project will be offset, specifically how the project will achieve a 'maintain or improve' outcome through the permanent conservation of native vegetation and threatened species habitats.
- Provide relevant information on the use and implementation of the NSW BioBanking Assessment Methodology (BBAM) and the EPBC Act *Environmental Offsets Policy* (DSEWPaC 2012) as the means for quantifying impacts and calculating the size and composition of the offset required.
- Describe the proposed offset site and its biodiversity values.
- Describe the proposed mechanism for securing the offset site under a legally binding agreement in perpetuity.
- Provide an outline of the proposed site rehabilitation and management regime that would be further developed in a detailed Management Action Plan (MAP).
- Describe the monitoring and reporting obligations for the offset site under the conservation covenant.

1.3 Site context

1.3.1 Development site

The proposed development site is located in the Wagga Wagga Local Government Area (LGA) at Kapooka, about eight kilometres south west of Wagga Wagga city centre in south-west NSW. The Kapooka Military Area, including the residential suburb of Kapooka and army base, is located about 50 metres west of the development site. An agricultural research station is located on the north western boundary of the development site. The rest of the landscape within the study area is dominated by a matrix of agricultural land and native woodland. The Sydney to Melbourne Rail Line passes through the study area.

The development area for this offset strategy is shown in Figure 1 and comprises a development footprint containing about 14.2 hectares of native canopy vegetation, of which 12.8 hectares is TSC Act and/or EPBC Act listed Box-Gum Woodland.

The development includes impacts on land within a 'Planning Agreement Area' that have been identified as biodiversity offsets for the biocertified Wagga Wagga Local Environment Plan (LEP) 2010. The Planning Agreement Areas were developed at a 10:1 offset ratio during the biocertification process. The loss of any native vegetation in these Planning Agreement Areas must be offset at a 10:1 ratio plus the original offset area that is removed (OEH agency response 20 December 2011). Therefore, 8.4 hectares would be offset at a ratio of 10:1 and the remaining 4.7 hectares outside these areas would use the BBAM to calculate the residual offset required (Table 1).

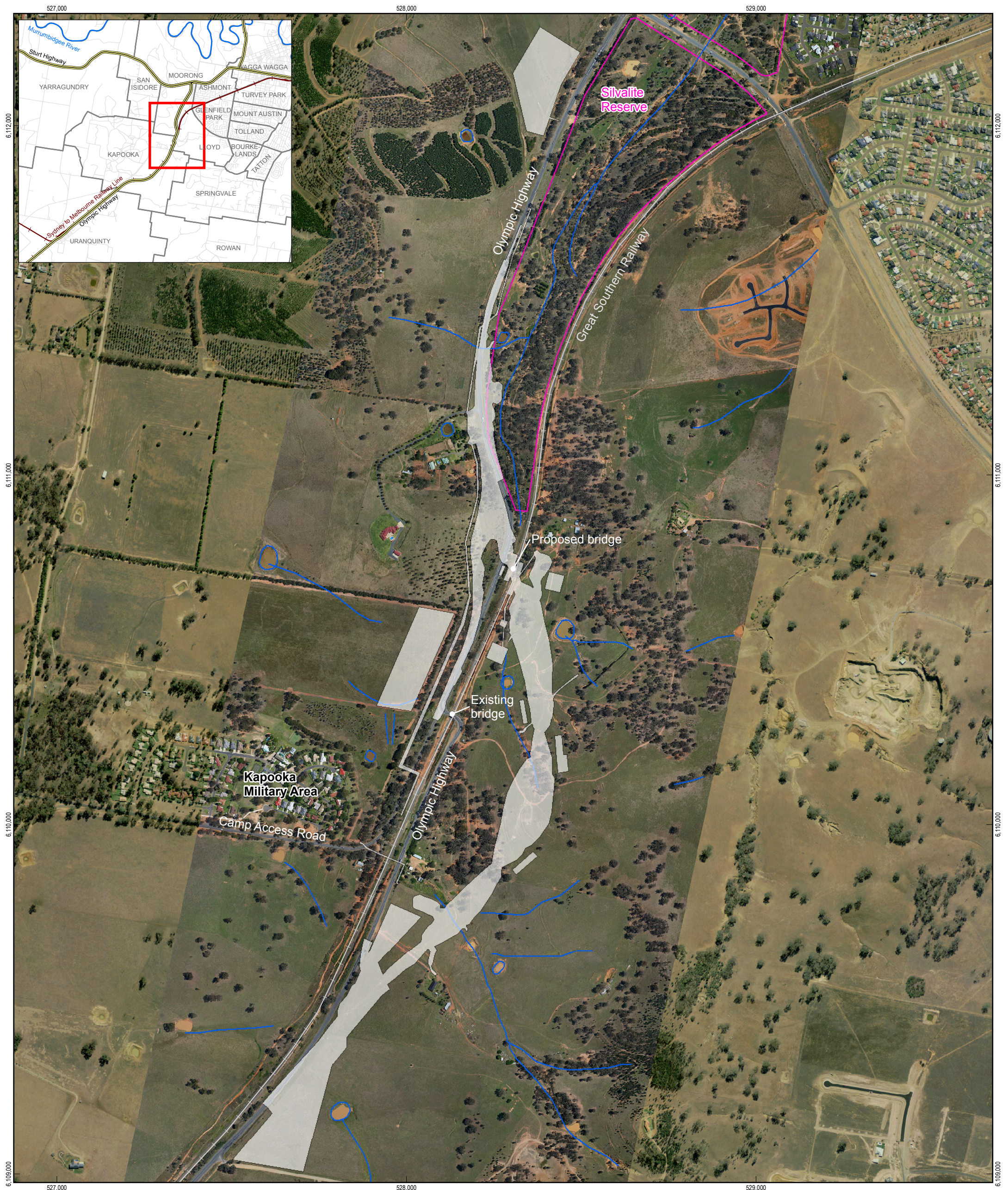
Table 1 - Area required to offset biodiversity impacts of the development.

Vegetation type	Native vegetation to be cleared (ha)	Required offset (ha)	Total offset (ha)
Box-Gum Woodland (Planning Agreement Areas)	8.4	84	92.4
Grassy White Box woodland on well drained	4.7	25.5	25.5

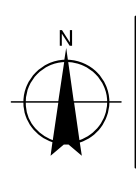
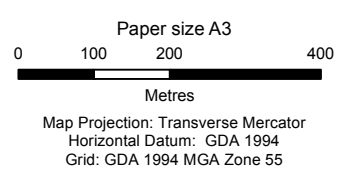
Vegetation type	Native vegetation to be cleared (ha)	Required offset (ha)	Total offset (ha)
podsollic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266, MR561)			
Total offsets 117.9 ha			

1.3.2 Offset site

The biodiversity offset site is about 298.3 hectares and located about 40 kilometres east of the development site. The offset site is located within the Wagga Wagga LGA and contains a mix of both native woodland vegetation and areas that have been previously cleared for agricultural purposes.



- LEGEND**
- Existing drainage
 - Rail line
 - Development site
 - Silvalite Reserve



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Nature Conservation Trust
Kapooka bridge replacement biodiversity offset

Job Number	23-15004
Revision	0
Date	20 Nov 2013

Development site location

Figure 1

G:\23\14107\GIS\Maps\Ecology_maps\Biodiversity\Final\BiodiversityReport\OakValley\23_15004_Fig1_DevelopmentSiteLocation.mxd Suite 3, Level 1, 161-169 Baylis Street Wagga Wagga NSW 2650 Australia T 61 2 6923 7400 F 61 2 6971 9565 E wgamail@ghd.com W www.ghd.com
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Data source: NSW LPI: Roads, railway lines, rivers, drainage lines, Silvalite Reserve boundary and suburbs - 2005; NSW Roads and Maritime Services: Road design and proposal features - 2011; aerial photography - 2011 & 2006. Created by:rtrobinson

1.4 NSW offsets

The NSW Biodiversity Banking and Offsets Scheme (BioBanking) has been established by the NSW Office of Environment and Heritage (OEH) to help address the loss of biodiversity and threatened species. The scheme attempts to create a market framework for the conservation of biodiversity values and the offsetting of development impacts. The scheme is currently voluntary.

The BBAM sets out how biodiversity values will be assessed, establishes rules for calculating the number and class of credits, and determines the trading rules that will apply. The BBAM includes a software package known as the BioBanking Credit Calculator (the credit calculator) which processes site survey and assessment data. The credit calculator specifies the type and extent of surveys required for a BioBanking assessment and then processes survey data to calculate the number and type of biodiversity credits that are either required at a development site or will be generated at a biobank site.

The BBAM was used to calculate the biodiversity offset requirements for the development site; however, the offset site is to be conserved under the *Nature Conservation Trust Act 2001* (NCT Act), rather than a BioBanking Agreement (see section 1.4.1 below). No credits would be purchased or retired as part of this offset strategy.

1.4.1 Nature Conservation Trust Act 2001

The objectives of the Nature Conservation Trust are to protect and enhance natural heritage by:

- Encouraging landholders to enter into cooperative arrangements for the management and protection of private land that is significant for the conservation of natural heritage.
- Providing mechanisms for achieving conservation outcomes.
- Promoting public knowledge, appreciation and understanding of natural heritage and the importance of its conservation.

A conservation land title covenant is a legally binding conservation agreement that the Nature Conservation Trust (NCT) uses to conserve biodiversity values on private land. It is a voluntary agreement that can apply to all or part of a property and helps the land owner to protect and enhance the natural values of their property. The covenant is registered on the property title, binding any future owners to uphold it, and may also be enforced by the Land and Environment Court.

The NCT is responsible for ensuring the property owner's compliance with the covenant through an environmental stewardship program. The program provides support and expertise for land owners to carry out the conservation objectives for the property.

The offset site would be conserved under a conservation land title covenant.

1.5 Commonwealth offsets

The EPBC Act biodiversity offsets for the project would comprise the conservation and management of an offset site referred to as the biodiversity offset site through a conservation land title covenant under the NCT Act. This Biodiversity offset site contains a similar vegetation type to that being impacted by the project; Box-Gum Grassy Woodland, and contains habitat for the three fauna species also listed under the EPBC Act. A conservation land title covenant would be placed on the property to offset the impacts of the project on EPBC Act matters as well as meet the requirements of the NSW EP&A Act for the proposed action.

1.6 Scope and limitations

Disclaimer

This report has been prepared by GHD for Nature Conservation Trust and may only be used and relied on by Nature Conservation Trust for the purpose agreed between GHD and the Nature Conservation Trust as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Nature Conservation Trust arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

2. Development impacts

2.1 NSW impacts

2.1.1 BioBanking credit calculations

For the development site, data was entered into the BioBanking credit calculator to estimate the number of credits, which were then converted to an area of land, that would be required if the entire development site was included in a conservation land title covenant. Credit requirements were calculated in Version 2 of the BioBanking Credit Calculator (OEH 2012).

The complete BioBanking Credit Report for the development site is provided in Appendix A.

The development site is located in the following landscape categories:

- Catchment Management Authority (CMA) region – Murrumbidgee.
- CMA sub-region - Upper Slopes.
- Mitchell Landscape – Wonga Hills and Ranges (DECC 2008b).

Development area landscape value

The BBAM uses 100 hectare and 1000 hectare assessment circles centred on the site to estimate the extent and connectivity of native vegetation and habitat surrounding the site. The site is a linear development and fits into a 1,000 hectare polygon for assessment purposes. A 100 hectare assessment circle was created and placed over the development footprint as per the standard application of the BBAM. The assessment circles for the development site are shown in Figure 2.

Vegetation cover and connectivity was estimated based on the native canopy cover before development and native canopy cover after the development of the site. The data in Table 2 was obtained from GIS measurement of foliage projective cover within the assessment circles. The percentage change in native vegetation cover was estimated by subtracting the area of the project development footprint from the total area within the assessment circle. Patch size and connectivity were assessed using GIS and aerial photo interpretation of native vegetation cover within the assessment circles and adjoining areas of native vegetation.

Impacts on connectivity are calculated by entering the 'primary link' for the development site, which is the vegetated link that will experience the greatest change in connectivity as a result of the development. The primary link for the development is in the middle of the subject site, where the primary link would be almost completely removed (Figure 2).

The woodland in the development site forms part of a vegetation corridor running north-south (around the western edge of Wagga Wagga), and to a lesser degree part of a vegetation corridor running east-west, linking with a corridor that runs through the urbanised area of Wagga Wagga. These corridors link to remnant vegetation patches south of the study area (eg Mount Flakney, Gregadoo Hills and Livingstone National Park).

Woodland east of the study area provides an important connecting corridor through the urbanised area of Wagga Wagga to vegetation on Willans Hill, which contains an important remnant of Box-Gum Woodland within the city. The project has the potential to fragment these corridors due to the width of the proposed road formation and clear zone requirements.

Table 2 - Development area landscape assessment values

% Native vegetation cover in 1000 ha assessment circle – before development	% Native vegetation cover in 1000 ha assessment circle – after development	% Native vegetation cover in 100 ha assessment circle– before development	% Native vegetation cover in 100 ha assessment circle– after development	Connectivity value width – before development	Connectivity value width – after development
34.8 (31-40)	33.9 (31-40)	59.3 (51-60)	53.2 (51-60)	20 m (>5-30 m)	1 m (0-5 m)

Development area site value

Only one vegetation zone and condition is present at the development site; Grassy White Box woodland on well drained podsollic clay soils on hills in the NSW South Western Slopes Bioregion (MR561) in moderate/good condition (Figure 3). Therefore, only one threatened species subzone is present. Only intact native vegetation (i.e. vegetation in moderate/good condition) requires biodiversity offsets as part of the project concurrence.

As discussed in section 1.3, vegetation within the development footprint that is required to be offset using the BBAM is equal to 4.7 hectares. The remaining 8.4 hectares would be offset at a set ratio of 10:1. Table 1 shows the area required to offset the biodiversity impacts of the project.

The area of contiguous treed vegetation connected to the development site was calculated with GIS and is equal to the maximum area within the BBAM of greater than 500 hectares, so for the threatened species subzone the adjacent remnant area is greater than 501 hectares. In addition, there is over 500 hectares of contiguous derived grassland with occasional paddock trees connected to the development site and so the patch size, including low condition vegetation is equal to the maximum area within the BBAM of 501 hectares.

The final credit calculations (see Appendix A) used the detailed plot data collected during surveys in December 2011 by GHD and was completed using credit calculator Version 2.

Changes in site biodiversity values through the development of a site is the basis for calculation of biodiversity credits required to offset impacts. Complete clearing of vegetation for a development reduces the site values to zero. There are certain circumstances where portions of a development are managed such that some site value is retained. These circumstances include asset protection zones where only partial vegetation removal may be required. It is assumed that the entire development site area will be cleared and so the default decrease in site value was entered into the credit calculator. This assumes that vegetation and habitat would be completely removed within the development site.

Development area ecosystem credits

A total of 237 ecosystem credits were calculated for the development site impact. This was calculated for the 4.7 hectares of Box-Gum Woodland to be removed that do not occur in the Planning Agreement Areas, as discussed above. The minimum percent native vegetation cover class used was 31-70 percent with a minimum patch size of greater than 100 hectares. The ecosystem credit profile for the development site is included as Appendix A.

Development area species with ecosystem credits

The credit calculator reports the suite of threatened fauna species that are predicted to be associated with ecosystem credits generated for the development. That is, the threatened fauna

species that are predicted to use habitat within the vegetation types at the site. Each of these species has a 'Tg score' that feeds into the ecosystem credit calculations. The fauna species with the lowest Tg score determines the overall credit requirement for the site. The lower the Tg score the greater the number of credits that are required to offset impacts on that species and all other species associated with the ecosystem credits. In certain cases, the fauna species with the lowest Tg score can be reliably excluded from occurring at the site and the credit calculations adjusted accordingly.

For the development, the species with the lowest Tg score is the Barking Owl (*Ninox connivens*) with a score of 0.33. The species is known to occur along the Murrumbidgee River north of the development site. There are recent records from the locality and the study area contains suitable prey species. Therefore the Tg score for this species was retained.

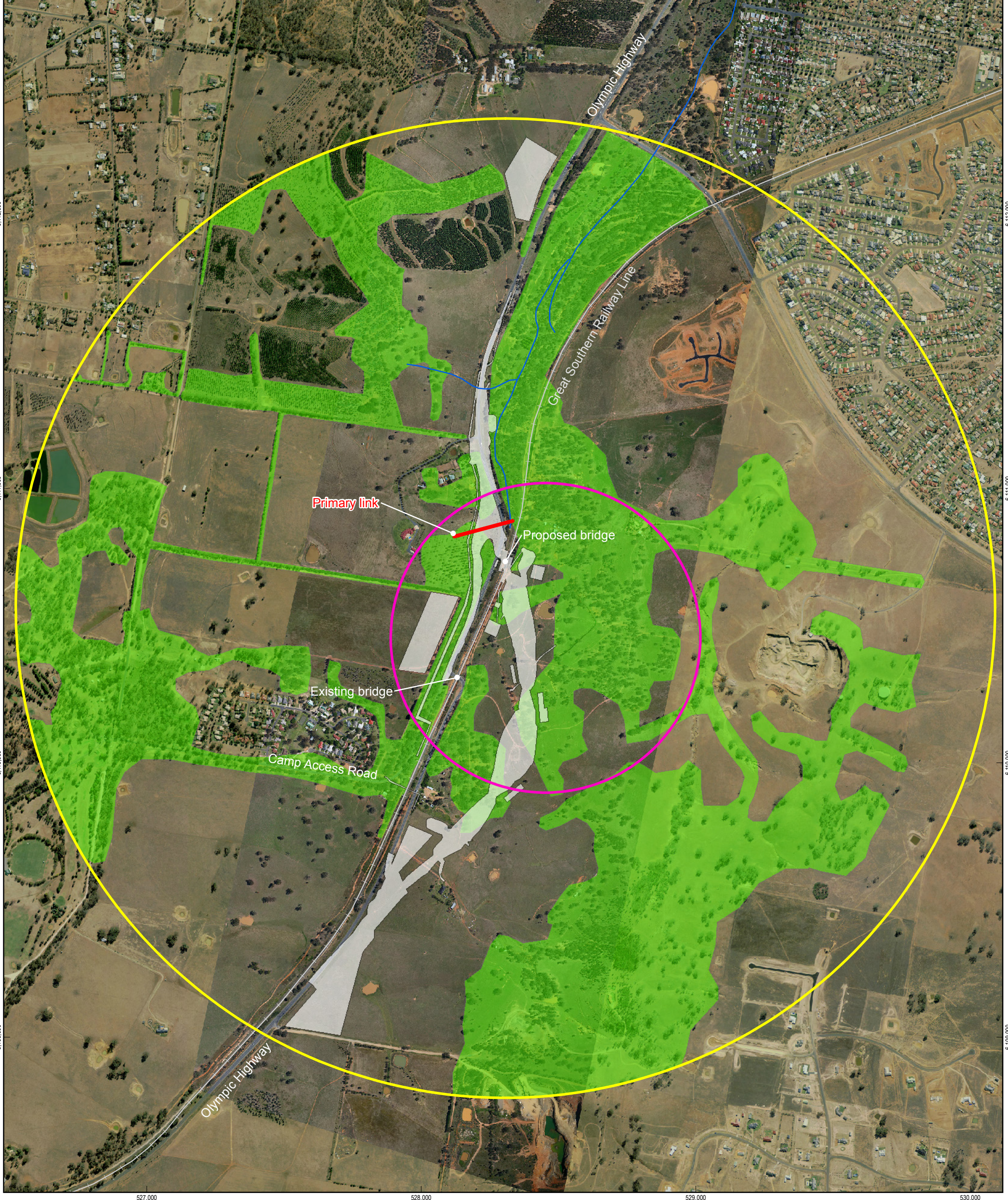
Development area species credits

The geographic and habitat questions in the credit calculator were answered based on habitat assessments conducted during the site survey. The credit calculator combines this information with the vegetation and landscape data to generate lists of the threatened species predicted to occur at the site and those requiring targeted survey.

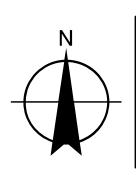
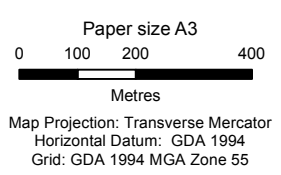
The results from targeted surveys for threatened species (GHD 2012, ARCUE 2013, WSP 2013, nghenvironmental 2013a and 2013b) were entered into the credit calculator at the 'Enter Threatened Species Survey Results' stage. No species credit-type threatened species were recorded in the study area and so for all threatened species predicted to occur; the data was entered as 'not present at the site' as a result of 'survey'. All of the threatened species which are known to occur in the study area are ecosystem credit-type threatened species and so no species credits were required for the BioBanking assessment.

Development area red flags

The development area contains a red flag area because the Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion is an over-cleared vegetation type and an endangered ecological community (refer to Appendix A). Since the development is to be assessed under Part 5 of the EP&A Act and a biobanking statement is not being obtained, then no further assessment of red flag areas is required.



- LEGEND**
- Primary link
 - Rail line
 - Drainage line
 - Development landscape assessment - 100ha
 - Development landscape assessment - 1,000ha
 - Development site
 - Native woody vegetation



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Kapooka bridge replacement biodiversity offset

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Development site landscape assessment

Figure 2

2.2 Commonwealth impacts

2.2.1 Box-Gum Grassy Woodland

The project would impact 14.2 hectares of native canopy vegetation, of which 12.6 hectares is equivalent to White Box Yellow Box Blakely's Red Gum Woodland and derived native grassland (Box-Gum Grassy Woodland) as listed under the EPBC Act.

The project impacts would result in the removal of vegetation from within the community and the potential fragmentation of the woodland throughout the study area. There is also the potential for the spread of weeds throughout the woodland, which poses a high risk to the long term persistence of good quality Box-Gum Grassy Woodland in the study area and locality.

Vegetation description

Vegetation mapping and surveys of the development site were conducted by GHD ecologists as part of the ecological assessment (GHD 2012) and Box-Gum Woodland surveys (GHD 2013) for the project.

The study area consists of woodland dominated by White Box (*Eucalyptus albens*), which complies with the classification criteria for the NSW plant community type (PCT) *White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion* (PCTID 266).

Due to the presence of White Box, a predominantly native understorey and other distinguishing characteristics, the vegetation community complies with the classification criteria for the Box Gum Grassy Woodland ecological community listed as critically endangered under the EPBC Act.

In the study area, areas of native grassland that are likely to have once supported a canopy of White Box were classified as the derived grassland form of the community. Woodland on the south-eastern side of the proposed road-over-rail bridge is predominantly grassy with an overstorey of White Box and no shrubs. Woodland on the north-western side of the proposed bridge is a mix of mature and regenerating White Box with a grassy understorey and midstorey of regenerating Golden Wattle (*Acacia pycnantha*).

Indirect impacts

The development site has been subject to disturbances associated with the existing road corridor and other surrounding linear infrastructure, and clearing for agriculture and residential expansion. The project would contribute to the cumulative impacts of vegetation clearing, habitat fragmentation, loss of habitat and degradation in the locality. The project is likely to be one of the larger contributors directly impacting Box-Gum Grassy Woodland in the study area because it will remove moderate/good quality vegetation including canopy trees. The nearby Lloyd residential expansion has been designed to occupy mostly low condition vegetation that has been cleared of canopy trees. In addition, there is continuing expansion and proposed growth within the Lloyd residential area to the east and the Kapooka Military Area to the west.

The project occurs in a locality where there is considerable development pressure primarily for residential purposes. This was recognised during the development of the Wagga Wagga Local Environment Plan (LEP). Subsequently, biocertification was sought for the LEP, including development and protection of biodiversity offsets areas in the form of the Planning Agreement Areas.

The project has the potential to increase edge effects in parts of the woodland in the study area during operation. This would include changes in the characteristics of the woodland in the study area, such as changes to sunlight, drainage and the incidence of weeds.

Vegetation clearing in addition to that which has previously occurred increases the impact of edge effects in the study area, with a greater potential for introduced flora species to encroach into native vegetation.

Based on the above the proposed action is not likely to have a significant impact on any Box-Gum Grassy Woodland outside of the direct impact footprint. Therefore no indirect impacts were included in the EPBC offset assessment guide calculations.

2.2.2 Superb Parrot

Remnant vegetation within the development site and study area provides foraging and roosting habitat for the threatened Superb Parrot. A flyway for the Superb Parrot occurs in the study area. Large numbers (>30) of adult birds, juveniles and fledglings were observed throughout the study area and locality during the surveys for the ecological assessment (GHD 2012), Species Impact Statement (SIS) (ngnvironmental 2013b) and previous surveys (eg CSU 2002, CSU 2005). Within the locality, this species breeds in River Red Gum habitats on the floodplain of the Murrumbidgee River and uses flyways to access food resources in surrounding Box-Gum Woodland habitats. In general, flyways for this species are variable in width and are dependent to some degree on the number of nests in a breeding colony, and their distribution in that colony (Webster and Ahern 1992). In the study area and locality, previous targeted surveys for this species (CSU 2005 and CSU 2006) indicate that the flyway for the species in the locality is about two kilometres wide.

About 32.5 hectares of potential habitat for the Superb Parrot would be impacted by the project, which includes all vegetation to be removed, due to the species being known to forage in grassland as well as woodland habitats. This is a relatively small proportion of the potential habitat for this species in the locality. High quality habitat for this species is present in other parts of the study area and outside the study area, including Silvalite Reserve, Pomingalarna Reserve and the Kapooka Military Area. Given the mobility of the Superb Parrot, it is unlikely that the project would significantly impact on the species. In addition, the Superb Parrot would not use the study area for breeding and is not dependent on breeding resources within the development site.

2.2.3 Swift Parrot

Remnant vegetation within the study area provides foraging and roosting habitat for the threatened Swift Parrot, which has been observed in Silvalite Reserve during previous surveys (OEH Bionet atlas record). Surveys conducted for the SIS also recorded the Swift Parrot foraging on Golden Wattle (*Acacia pycnantha*) in the study area near the decommissioned fuel depot (ngnvironmental 2013a). The White Box trees in the study area provide a foraging resource for the Swift Parrot during winter when the species migrates to the mainland from Tasmania. The species would not use the study area for breeding as it only breeds in Tasmania.

About 14.2 hectares of potential habitat for the Swift Parrot would be impacted by the project, which includes only woodland vegetation as the species does not forage in grassland habitats. This is a relatively small proportion of the potential habitat for this species in the locality. High quality habitat for this species is present in other parts of the study area and outside the study area, including Silvalite Reserve, Pomingalarna Reserve and the Kapooka Military Area. Given the mobility of the Swift Parrot, it is unlikely that the project would significantly impact on the species.

2.2.4 Corben's Long-eared Bat

Remnant vegetation within the study area may provide foraging and roosting habitat for the threatened Corben's Long-eared Bat, which has not been recorded in the locality. It was not recorded during targeted surveys undertaken in 2013 (WSP 2013). Hollow-bearing trees and loose bark in the study area may potentially be used by the species for breeding.

About 14.2 hectares of potential habitat for Corben's Long-eared Bat would be impacted by the project, which includes only woodland vegetation and the removal of about 13 hollow-bearing trees. This is a relatively small proportion of the potential habitat for this species in the locality, with an additional 439 hollow-bearing trees surveyed in the locality. High quality habitat for this species is present in other parts of the study area and outside the study area, including Silvalite Reserve, Pomingalarna Reserve and the Kapooka Military Area. Given the mobility of Corben's Long-eared Bat, it is unlikely that the project would significantly impact on the species. In addition, targeted surveys for the SIS did not record the species in the study area or locality and it was concluded that the species would only occur as a vagrant in the locality (WSP 2013).

3. Offset requirements

3.1 Location and tenure of the proposed offset site

The offset site is located about 40 kilometres east of the development site, east of Wagga Wagga, as shown in Figure 4. The property is 363 hectares, is located within the Wagga Wagga LGA and contains a mix of both woodland vegetation and areas that have previously been cleared for agricultural purposes.

The biodiversity offset site is currently zoned RU1 Primary Production under the Wagga Wagga LEP. The site contains predominantly native vegetation and is currently used for low density stock grazing and timber getting.

Historical land uses within the offset site appear to have included grazing, livestock keeping and timber getting. Areas within the site that have been disturbed include those areas adjacent to fence lines and gates, farm dams, as well as existing access tracks and roads throughout the site.

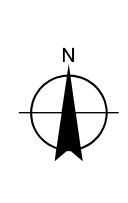
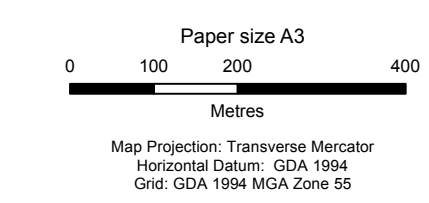
Of the 363 hectares, about 298.3 hectares is native vegetation and would be suitable to be used for the offset site. The remaining area (about 65 hectares) would be excluded from the offset site and covenant due to its low biodiversity values. The property is generally surrounded by cleared agricultural land, however, is located a short distance from the riparian corridor of the Murrumbidgee River about three kilometres to the north

The site contains a mixture of canopy species including; White Box (*Eucalyptus albens*) and Blakely's Red Gum (*E. blakelyi*) most commonly, with small occurrences of Mugga Ironbark (*E. sideroxylon*), Red Stringybark (*E. macrorhyncha*), Yellow Box (*E. melliodora*) and White Cypress Pine (*Callitris glaucophylla*) occurring on lower to mid-slopes. The majority of the areas of canopy vegetation, excluding paddock trees, classify as the threatened ecological community Box-Gum Woodland listed under the TSC Act (endangered) and/or the EPBC Act (critically endangered).

Portions of the site have relatively dense infestations of the noxious weed St John's Wort (*Hypericum perforatum*). These generally occur where canopy cover is absent or low, with portions of these low quality areas excluded from the offset site due to having little to no conservation value. The remainder of the property would form the offset site, covering 298.3 hectares.

The offset site is located in the following landscape categories:

- CMA region – Murrumbidgee.
- CMA sub-region - Upper Slopes.
- Mitchell Landscape – Carabost Hills and Ranges (DECC 2008b).



LEGEND

Road	Offset site boundary
Drainage line	Property boundary



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Offset site location

Figure 4

3.2 Landscape context

The offset site covers an area of 298.3 hectares. The site is connected to the riparian corridor of the Murrumbidgee River to the north, which contains a continuous linear corridor of native vegetation along its length. Vegetated corridors connect the offset site with other patches of native vegetation throughout the region, although this connectivity is patchy and there are few large remnant patches located nearby the offset site.

The offset site contains a mixture of intact native vegetation in good condition and cleared agricultural land with scattered trees in low condition. The site does not contain any permanent creeks or waterways, however, a number of ephemeral drainage lines exist throughout

3.3 Vegetation types within the biodiversity offset site

GHD undertook a site visit at the offset site for preliminary vegetation mapping on 28 August 2013 with subsequent surveys between 23 and 27 September 2013. A total of 25 vegetation plots (50 m x 20 m with nested 20 m x 20 m) were completed and vegetation communities were mapped across the property. The aim of sampling floral diversity and vegetation structure using plots was to ensure sufficient information was available to address the EPBC Act identification guidelines for Box-Gum Grassy Woodland (DEH 2006).

Field surveys identified three vegetation types within the biodiversity offset site. Two of the vegetation types classify for listing as Box-Gum Woodland under the TSC Act and contain patches of the critically endangered Box-Gum Grassy Woodland listed under the EPBC Act (see Table 3).

Table 3 - Vegetation types within the biodiversity offset site

Vegetation Type	Area in offset site (ha)	Conservation significance	Comment
Grassy White Box – Blakely’s Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion	246.1	Box-Gum Woodland (TSC Act) and Box-Gum Grassy Woodland EPBC Act (parts only)	Contains a mixture of low condition vegetation with minimal canopy cover and less than 50 percent native groundcover, patches in poor condition with a higher canopy cover and native groundcover percent and patches in medium condition with structurally moderate vegetation cover with native groundcover vegetation greater than 50 percent.
Mugga Ironbark – Inland Grey Box – Pine tall woodland of the NSW South Western Slopes Bioregion	10.9	Native vegetation (not listed under TSC or EPBC Act)	Contains vegetation in medium condition with structurally moderate vegetation cover with groundcover native vegetation greater than 50 percent.
White Box – White Cypress – Inland Grey Box woodland on the western slopes of NSW	41.3	Box-Gum Woodland (TSC Act) and Box-Gum Grassy Woodland EPBC Act (parts only)	Contains patches in low condition with minimal canopy cover and less than 50 percent native groundcover and patches in medium condition with structurally moderate vegetation cover with native groundcover vegetation greater than 50 percent.
TOTAL AREA	298.3 ha		

3.4 NSW offset requirements

3.4.1 BioBanking credit calculations

Biodiversity offset site landscape value

The landscape value was assessed using GIS and air photo interpretation of native vegetation cover within the assessment circles and adjoining areas of native vegetation. The biodiversity offset site is a generally isolated patch of native vegetation that is connected to native vegetation along the riparian corridor of the Murrumbidgee River to the north. Links to other patches of native vegetation in the region are via roadside vegetation corridors and riparian corridors of creeks in the study area.

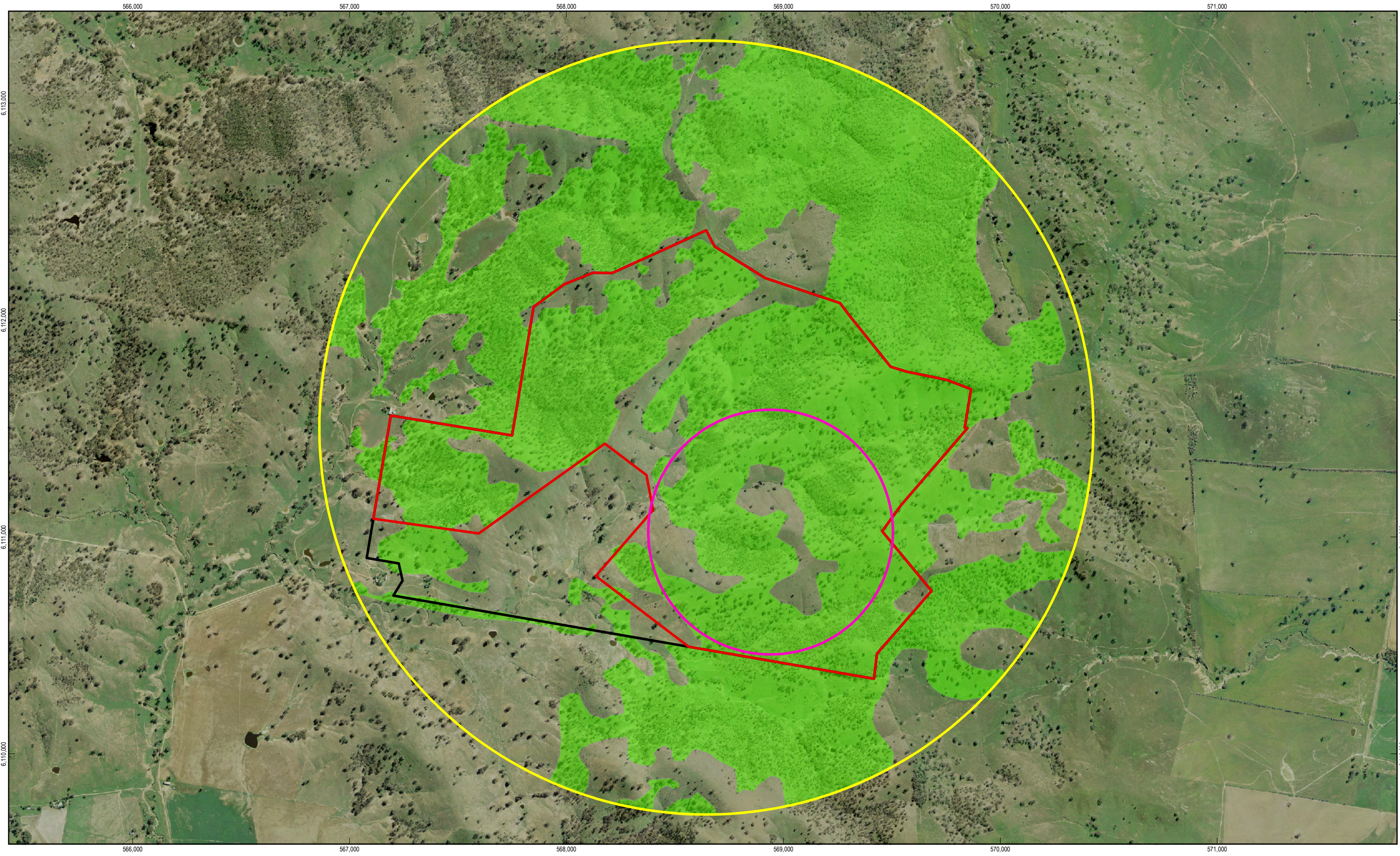
A 1,000 hectare and a 100 hectare assessment circle were created over the biodiversity offset site as per the BBAM. The site fits within a single 1,000 hectare assessment circle. The 100 hectare assessment circle and primary link were placed over low condition vegetation at the site so as to capture the greatest possible change in vegetation cover with the establishment of the offset site. The landscape assessment is shown in Figure 5. Vegetation cover and connectivity were estimated with GIS based on the current situation and after establishment and management of the offset site. The data in Table 4 below was obtained from GIS measurement of foliage projective cover within the assessment circles and the width of the primary link.

Management of the offset site would increase the foliage projective cover within the assessment circles through regeneration of low condition vegetation. This increase was not sufficient to increase the score to a higher cover class.

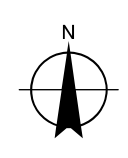
The primary link of the biodiversity offset site is currently greater than 500 metres which is the maximum width that is able to be entered into the credit calculator. Therefore although there may be an increase in the width of the primary link as a result of the biobank, there will be no gain in linkage width classes, which will remain at greater than 500 metres before and after the biobank site.

Table 4 - Biodiversity offset site landscape assessment

% Native vegetation cover in 1000 ha assessment circle – before biobank	% Native vegetation cover in 1000 ha assessment circle – after biobank	% Native vegetation cover in 100 ha assessment circle– before biobank	% Native vegetation cover in 100 ha assessment circle– after biobank	Connectivity value width – before biobank	Connectivity value width– after biobank
63.8 (61-70)	66 (61-70)	80.8 (81-90)	85 (81-90)	> 500 m	> 500 m



Paper size A3
 0 100 200 400
 Metres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



- LEGEND**
- Offset site boundary
 - Property boundary
 - Native woody vegetation
 - Offset site landscape assessment - 100ha
 - Offset site landscape assessment - 1000ha



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Offset site landscape assessment

Figure 5

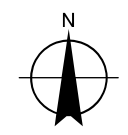
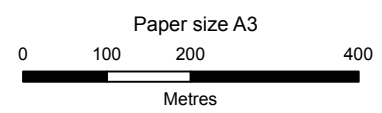
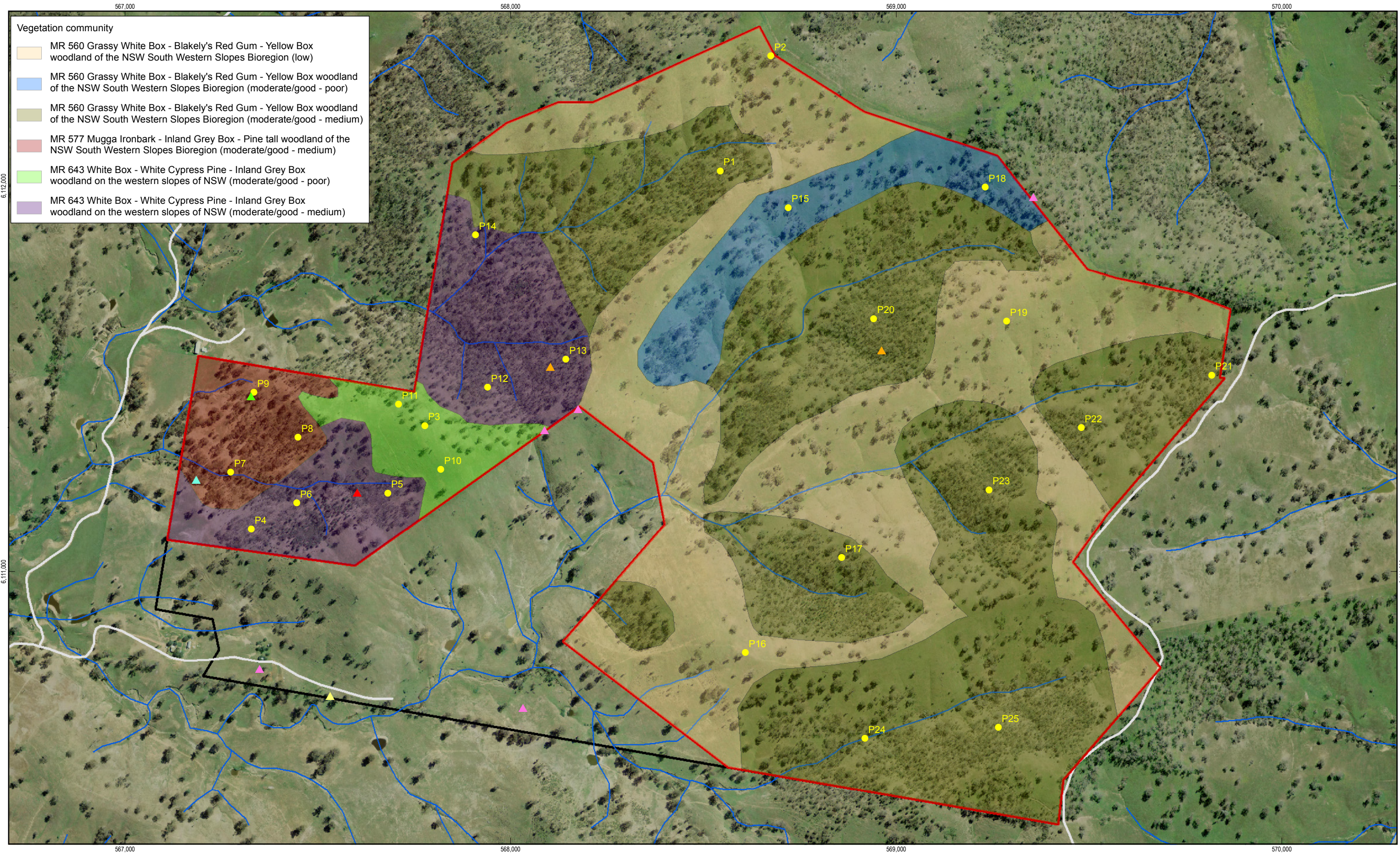
Biodiversity offset site value

One vegetation zone was created for each native vegetation type and broad condition class identified in the site surveys. Vegetation zones within the biodiversity offset site are in Table 5. The biodiversity offset site is part of a continuous patch of native vegetation that is over 1000 hectares in area. Therefore for all vegetation zones which contain native vegetation in 'moderate/good' condition 'adjacent remnant area' and 'patch size, including low condition vegetation' is equal to the maximum patch size within the BBAM (501 hectares). Two vegetation zones are in 'low' condition and so 'adjacent remnant area' equals zero. This low condition vegetation is continuous with over 500 hectares of intact vegetation and so 'patch size, including low condition vegetation' is equal to the maximum patch size within the BBAM (501 hectares).

The conservation status of vegetation types within the offset site was determined based on plot data, habitat assessments, OEH profiles and the experience and judgement of GHD field ecologists. There is one endangered ecological community at the site, Box-Gum Woodland.

Table 5 - Biodiversity offset site vegetation zones

Vegetation zone and condition	Area (ha)	Adjacent remnant area	Patch size including low condition	Plot/transects completed
Grassy White Box – Blakely's Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion (MR 560) – low condition	93.7	0	501	P2, P16, P19
Grassy White Box – Blakely's Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion (MR 560) – moderate/good poor condition	16.49	501	501	P15, P18
Grassy White Box – Blakely's Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion (MR 560) – moderate/good medium condition	135.88	501	501	P1, P17, P20, P21, P22, P23, P24, P25
Mugga Ironbark – Inland Grey Box – Pine tall woodland of the NSW South Western Slopes Bioregion (MR 577) – moderate/good medium condition	10.9	501	501	P7, P8, P9
White Box – White Cypress – Inland Grey Box woodland on the western slopes of NSW (MR 643) – low condition	9.2	0	501	P3, P10, P11
White Box – White Cypress – Inland Grey Box woodland on the western slopes of NSW (MR 643) – moderate/good medium condition	32.1	501	501	P4, P5, P6, P12, P13, P14
Total Area	298.27			



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



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Offset site vegetation zones

Figure 6

Increases in site biodiversity values through establishment and management of the offset site is the basis for calculation of biodiversity credits that are generated. Specific management actions are not proposed for moderate/good condition vegetation zones and so the default increase in site value was entered into the credit calculator as shown in Table 6. This assumes that vegetation and habitat would be managed according to the standard minimum actions required by the BBAM.

Table 6 - Biodiversity offset site management zones

Management zone	Vegetation zone	Area (ha)	Management / attribute scores
Grassy White Box – Blakely's Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion	MR 560 low	93.7	Standard management / default increase in site value.
Grassy White Box – Blakely's Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion	MR 560 moderate/good poor	16.49	Standard management / default increase in site value.
Grassy White Box – Blakely's Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion	MR 560 moderate/good medium	135.88	Standard management / default increase in site value.
Mugga Ironbark – Inland Grey Box – Pine tall woodland of the NSW South Western Slopes Bioregion	MR 577 moderate/good medium	10.9	Standard management / default increase in site value.
White Box – White Cypress – Inland Grey Box woodland on the western slopes of NSW	MR 643 low	9.2	Standard management / default increase in site value.
White Box – White Cypress – Inland Grey Box woodland on the western slopes of NSW	MR 643 moderate/good medium	32.1	Standard management / default increase in site value.
Total area		298.27	

Biodiversity offset site ecosystem credits

The ecosystem credit profile for the biodiversity offset site is included as Appendix B and summarised in Table 7. Not all of these ecosystem credits would be required to offset impacts of the development. The credits that would be used as the offset package for the development site are in Section 4.

Table 7 - Biodiversity offset site ecosystem credit profile

Vegetation type	Area (ha)	Patch size including low condition	Surrounding vegetation % cover class	Ecosystem credits generated
Grassy White Box – Blakely's Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion (MR 560) – low	93.7	501	11-30	889
Grassy White Box – Blakely's Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion (MR 560) – moderate/good	16.49	501	11-30	144

Vegetation type	Area (ha)	Patch size including low condition	Surrounding vegetation % cover class	Ecosystem credits generated
poor				
Grassy White Box – Blakely’s Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion (MR 560) – moderate/good medium	135.88	501	11-30	1,322
Mugga Ironbark – Inland Grey Box – Pine tall woodland of the NSW South Western Slopes Bioregion (MR 577) – moderate/good medium	10.9	501	11-30	102
White Box – White Cypress – Inland Grey Box woodland on the western slopes of NSW (MR 643) – low	9.2	501	11-30	88
White Box – White Cypress – Inland Grey Box woodland on the western slopes of NSW (MR 643) – moderate/good medium	32.1	501	11-30	283
Total	298.27			2,828

The Commonwealth biodiversity offsets required for the project would comprise the conservation and management of the offset site through a conservation land title covenant. The portion of the biodiversity offset site that would comprise the offset site for the development was determined by dividing the number of biodiversity credits that would be required (237) by the average rate of credits per hectare for that ecosystem type at the offset site (9.3 per hectare) yielding 25.5 hectares. This was then added to the offset required for the Planning Agreement Areas, which is a 10:1 ratio of what is being removed by the project, plus the original area, which is 92.4 hectares. The total area that would be set aside as the direct offset required for the project is 117.9 hectares.

Species within ecosystem credits

The credit calculator reports the suite of threatened fauna species that are predicted to be associated with ecosystem credits generated for the biodiversity offset site and the fauna species with the lowest Tg score determines the overall credit requirement for the site. The species predicted to occur in ecosystem credits associated with the biodiversity offset site are presented in Appendix B. For the offset site the predicted threatened species with the lowest Tg score is the Barking Owl, which has a Tg score of 0.33. There is potential foraging and breeding habitat for this owl species within the biobank site therefore the Tg score and ecosystem credit calculations presented in this report do not require adjustment.

Biodiversity offset site species credits

The results from targeted surveys for threatened species are entered into the credit calculator in step 5e ‘enter threatened species survey results’. For each species, the credit calculator requires a ‘yes’ or ‘no’ answer for the question, ‘is the species present and to be managed at the biobank site?’ Answers must be justified by recording the identification method as either

'survey', 'assumed presence' or 'expert report'. No species credit-type threatened fauna species were recorded and so for all species credit-type threatened species the data was entered as 'no' and 'survey'.

No targeted surveys for threatened species have been conducted at the offset site; however seven threatened species (ecosystem credit species) were recorded opportunistically during site surveys:

- Brown Treecreeper (*Climacteris picumnus victoriae*) – vulnerable.
- Diamond Firetail (*Stagonopleura guttata*) – vulnerable.
- Hooded Robin (*Melanodryas cucullata cucullata*) – vulnerable.
- Scarlet Robin (*Petroica boodang*) – vulnerable.
- Little Lorikeet (*Glossopsitta pusilla*) – vulnerable.
- Flame Robin (*Petroica phoenicea*) – vulnerable.
- Superb Parrot (*Polytelis swainsonii*) – vulnerable.

Evidence of the Squirrel Glider (scratch marks on a tree) was identified along one of the gully areas of the offset site. Due to the close proximity of the Murrumbidgee River (about 2 kilometres to the north), it is considered highly likely the Squirrel Glider would be present at the offset site.

Suitability of the site

There is not a direct match between vegetation types within the development site and the offset site, which reflects the inherent difficulty of identifying a viable offset site or sites with the desired attributes. Despite this, the biodiversity offset site is considered to be a suitable offset site for the development due to:

- The ability to substitute the vegetation type ecosystem credits of Box-Gum Woodland endangered ecological community with ecosystem credits of Box-Gum Woodland from a different vegetation type.
- The presence of vegetation of high conservation significance (Box-Gum Woodland).
- The presence of native vegetation in moderate/good condition and associated habitat resources.
- The functional similarity of vegetation at the site with vegetation to be removed in the development site.
- The presence of habitat resources for a range of threatened biota including several woodland bird species that are known from the development site and offset site.

Security of offset delivery

The offset site is the preferred site for this project due to it meeting the offsetting requirements of the development. Once this offset strategy is adopted and the site is purchased, The Nature Conservation Trust would secure the site under a conservation land title covenant (see section 1.4.1).

3.5 Commonwealth offset requirements

The EPBC Act *Environmental Offsets Policy* (DSEWPaC 2012) requires a formal assessment of impacts and offset contributions using the 'offsets assessment guide'. The guide utilises a balance sheet approach to measure impacts and offsets.

According to the EPBC Act *Environmental Offsets Policy* (DSEWPaC 2012), controlled actions requiring offsets must achieve a minimum 90 per cent 'direct offset'. Direct offsets are defined as 'those actions that provide a measurable conservation gain for an impacted protected matter'. A conservation gain for the protected matter may be achieved by such measures as:

- Improving existing habitat.
- Creating new habitat.
- Reducing threats and/or.
- Averting the loss of a protected matter or its habitat that is under threat.

The assessment guide requires data and subjective scores to be added to a spreadsheet style format for each EPBC Act matter. The offsets guide is run for each relevant EPBC Act matter. Hence for the current assessment, the calculator has been run four times; once each for Box-Gum Grassy Woodland, the Superb Parrot, Swift Parrot and Corben's Long-eared Bat.

The offsets guide has two parts: one part addresses the estimated impacts on the protected matter and the second parts deals with how the proposed offset addresses the protected matter. For the current assessment, the area of habitat loss for the four Matters of National Environmental Significance (MNES) that were presented in the ecological assessment (GHD 2012) and referral were entered into the tool. Scores for habitat quality were then entered into the impacts calculator. Mapped areas of habitat for the four matters within the offset site were then entered into the offset section of the guide. Scores for habitat quality, 'time to ecological benefit', risk of loss (with and without offset) and other variables were then entered for each matter.

The variables that require entries into the offset assessment guide, along with the score that have been assigned to each variable and a justification for the score are shown in Table 8. The results of the offset calculations are described in Section 3.5.1.

Areas entered in the offset calculator were based on the offset site achieving a 100 per cent direct offset in order to indicate the potential area required for each matter to be offset under varying start quality conditions.

Based on the plots values of observations made during the site visit. The start site quality is likely to vary from low to moderate.

The results of the final offsets calculations for all four matters are provided in Appendix C.

3.5.1 EPBC offset assessment guide calculations

Box-Gum Grassy Woodland

Box-Gum Grassy Woodland across the proposed offset site has a moderate quality start value. Although some patches may be of higher value and some of lower value, it is generally of moderate quality.

Assuming a moderate start quality and that targeted management actions over time would increase the quality of the offset site for Box-Gum Grassy Woodland, the required offset for Box-Gum Grassy Woodland to achieve 100 per cent direct offsets would be 110 hectares. The offset results for Box-Gum Grassy Woodland are provided in Appendix C.

The total area of Box-Gum Grassy Woodland within the proposed offset site is 176.4 hectares and is outlined in Figure 7. Not all of these areas would be required to offset the impacts of the project. A residual 66.4 hectares of Box-Gum Grassy Woodland would be available at the offset site.

Under the NSW offsets required for the project the 117.9 hectares required for the offset would be comprised wholly of vegetation that forms the TSC Act listed Box-Gum Woodland. Given the 110 hectares required to offset Box-Gum Grassy Woodland under the EPBC Act, offset areas for this community would be chosen to meet both the State and Commonwealth definitions of the community in the same areas.

The results of the offset assessment guide calculations (Appendix C) indicate that the percentage of impacts offset by the proposed biodiversity offset site is 100.57 per cent. This is based on an estimated loss of 12.6 hectares of Box-Gum Grassy Woodland (area of community) as reported in the ecological assessment. On this basis, the proposed biodiversity offset site achieves the minimum 90 per cent direct offset required by DSEWPaC (2012) in the *Environmental Offsets Policy*, and also achieves 100 per cent of the total offset requirement, all as a direct offset.

The data entered in the offset assessment guide calculations for Box-Gum Grassy Woodland are summarised in Table 8 along with the justification for the attribute values that were entered and the estimated percentage of the direct offset requirement that would be met by the biodiversity offset site.

Data for the assessment was defined with reference to the site survey and assessment data and the DSEWPaC (2012) guide to the operation of the assessment guide.

Superb Parrot

As noted in Section 2.2, Superb Parrots were recorded at the development site and in the study area of the development site. They have also been recorded at the offset site. To calculate the impacts on this species using the EPBC offsets assessment guide, the quantum of impacts was entered as an area of habitat.

Because Superb Parrots are known to forage in both native and introduced vegetation, habitat for the Superb Parrot potentially impacted would include disturbance to native and non-native vegetation. This equates to an area of impact of 32.5 hectares.

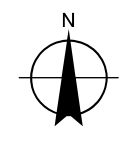
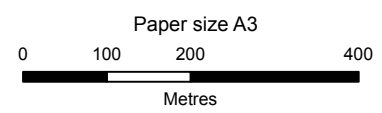
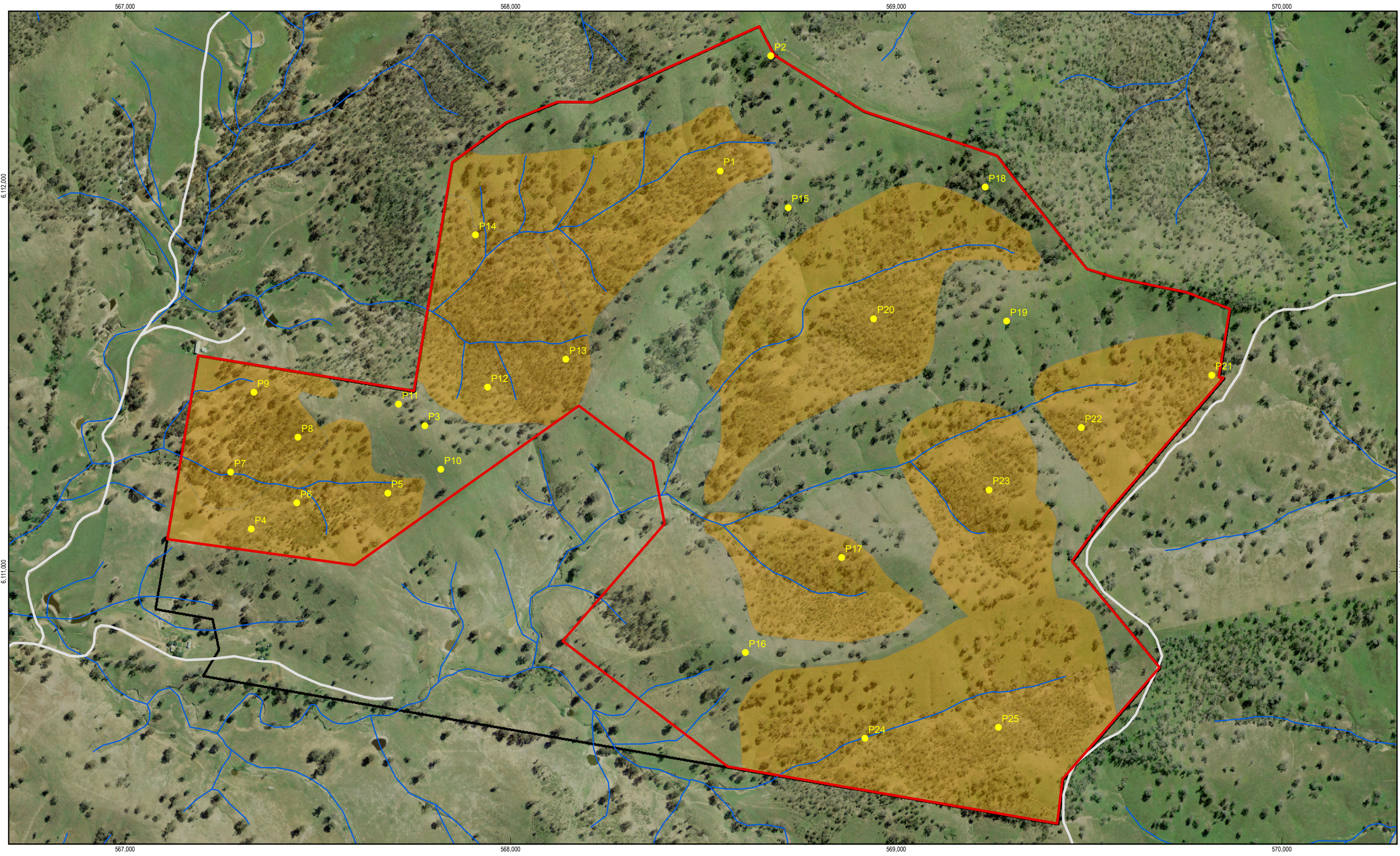
Superb Parrot habitat across the proposed offset site has a moderate quality start value. Although some patches may be of higher value and some of lower value, it is generally of moderate quality. It should be noted that Superb Parrots are known to utilise low quality habitat for foraging e.g. introduced grasslands and crops (Webster and Ahern 1992).

Assuming a moderate start quality and that targeted management actions over time would increase the quality of the offset site for Superb Parrot, the required offset for Superb Parrot to achieve 100 per cent direct offsets would be 108 hectares. The offset results for Superb Parrot are provided in Appendix C.

The results of the offset assessment guide calculations (Appendix C) indicate that the percentage of impacts offset by the proposed biodiversity offset site is 100.17 per cent. This is based on an estimated loss of 32.5 hectares of Superb Parrot habitat (area of habitat) as reported in the ecological assessment. On this basis, the proposed biodiversity offset site achieves the minimum 90 per cent direct offset required by DSEWPaC (2012) in the *Environmental Offsets Policy*, and also achieves 100 per cent of the total offset requirement, all as a direct offset.

The data entered in the offset assessment guide calculations for Superb Parrot are summarised in Table 8 along with the justification for the attribute values that were entered and the estimated percentage of the direct offset requirement that would be met by this biodiversity offset proposal.

Data for the assessment was defined with reference to the site survey and assessment data and the DSEWPaC (2012) guide to the operation of the calculator.



LEGEND

- Flora survey plot
- Road
- Drainage line
- Commonwealth Box-Gum Grassy Woodland
- Offset boundary
- Property boundary



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**Offset site Commonwealth Box-Gum
Grassy Woodland**

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Figure 7

Swift Parrot

As noted in Section 2.2, Swift Parrots were recorded at the development site and in the study area of the development site. Although none have been recorded at the offset site during site visits, this species is considered highly likely to occur when foraging resources are available. To calculate the impacts on this species using the EPBC offsets assessment guide, the quantum of impacts was entered as an area of habitat.

Because Swift Parrots are unlikely to forage in low quality and introduced vegetation, habitat for the Swift Parrot potentially impacted would only include removal of medium or high quality native vegetation. This equates to an area of impact of 14.2 hectares

Swift Parrot habitat across the proposed offset site has a moderate quality start value. Although some patches may be of higher value and some of lower value, it is generally of moderate quality.

Assuming a moderate start quality and that targeted management actions over time would increase the quality of the offset site for Swift Parrot, the required offset for Swift Parrot to achieve 100 per cent direct offsets would be 57.5 hectares. The offset results for Swift Parrot are provided in Appendix C.

The results of the offset assessment guide calculations (Appendix C) indicate that the percentage of impacts offset by the proposed biodiversity offset site is 100.07 per cent. This is based on an estimated loss of 14.2 hectares of Swift Parrot habitat (area of habitat) as reported in the ecological assessment. On this basis, the proposed biodiversity offset site achieves the minimum 90 per cent direct offset required by DSEWPaC (2012) in the *Environmental Offsets Policy*, and also achieves 100 per cent of the total offset requirement, all as a direct offset.

The data entered in the offset assessment guide calculations for Swift Parrot are summarised in Table 8 along with the justification for the attribute values that were entered and the estimated percentage of the direct offset requirement that would be met by this biodiversity offset proposal.

Data for the assessment was defined with reference to the site survey and assessment data and the DSEWPaC (2012) guide to the operation of the calculator.

Corben's Long-eared Bat

As noted in Section 2.2, Corben's Long-eared Bat has not been recorded in the study area or locality of the development site or offset site. To calculate the impacts on this species using the EPBC offsets calculator, the quantum of impacts was entered as an area of habitat.

Because Corben's Long-eared Bat is unlikely to forage in grassland areas, habitat for Corben's Long-eared Bat potentially impacted would only include disturbance to woodland areas. This equates to an area of impact of 14.2 hectares.

Corben's Long-eared Bat habitat across the proposed offset site has a moderate quality start value. Although some patches may be of higher value and some of lower value, it is generally of moderate quality.

Assuming a moderate start quality and that targeted management actions over time would increase the quality of the offset site for Corben's Long-eared Bat, the required offset for Corben's Long-eared Bat to achieve 100 per cent direct offsets would be 47.5 hectares. The offset results for Corben's Long-eared Bat are provided in Appendix C.

The results of the offset assessment guide calculations (Appendix C) indicate that the percentage of impacts offset by the proposed biodiversity offset site is 100.83 per cent. This is

based on an estimated loss of 14.2 hectares of Corben's Long-eared Bat habitat (area of habitat) as reported in the ecological assessment. On this basis, the proposed biodiversity offset site achieves the minimum 90 per cent direct offset required by DSEWPaC (2012) in the *Environmental Offsets Policy*, and also achieves 100 per cent of the total offset requirement, all as a direct offset.

The data entered in the offset assessment guide calculations for Corben's Long-eared Bat are summarised in Table 8 along with the justification for the attribute values that were entered and the estimated percentage of the direct offset requirement that would be met by this biodiversity offset proposal.

Data for the assessment was defined with reference to the site survey and assessment data and the DSEWPaC (2012) guide to the operation of the calculator.

Table 8 - Attribute values entered in the offset assessment guide calculations for the four matters of NES

Calculator variable	Offset start quality	Matter of NES and score	Justification
Impact Calculator - Quantum of impact - Area	N/A	12.6 – Box-Gum 32.5 – Superb Parrot 14.2 – Swift Parrot 14.2 – Corben’s Long-eared Bat	Permanent area of habitat to be lost as per the ecological assessment.
Impact Calculator - Quantum of impact – Quality	N/A	7 – all matters	Quality of site to be impacted at Kapooka is above average but not excellent, does include introduced groundlayer and declared noxious weed species, feral animals and regrowth areas. Patchily connected across the landscape.
Offset calculator – Time horizon – Risk related time horizon	N/A	20 – all matters	Offsets are in perpetuity and hence would be managed on an annual basis for conservation. Twenty years is the shortest timeframe.
Offset calculator – Time horizon – Time until ecological benefit	N/A	20 – all matters	Conservative 20 year estimate based on previous advice from DSEWPaC in similar Box-Gum Woodland habitat.
Offset calculator – Start area and quality - Area	Moderate	110 – Box-Gum 108 – Superb Parrot 57.5 – Swift Parrot 47.5 – Corben’s Long-eared Bat	Area for each matter based on hectares required to achieve a 100% direct offset for each matter under moderate condition offset start qualities.
Offset calculator – Start area and quality – Start quality (1-10)	Moderate	5 – Box-Gum 6 – Superb Parrot 6 – Swift Parrot 6 – Corben’s Long-eared Bat	Offset start quality based on availability of potential habitat within offset property. Scores based on targeted plot and survey data within the property and potential availability of habitat attributes throughout the property.
Offset calculator -Future area and quality without offset – Risk of loss without offset (%)	N/A	10	Terrain of the property makes vehicular access relatively limited in most areas where biodiversity values are higher. Currently no services available on the property. Recent old growth timber getting observed which may persist over time.

Calculator variable	Offset start quality	Matter of NES and score	Justification
Offset calculator -Future area and quality without offset – Future quality without offset (1-10)	Moderate	5 – Box-Gum 6 – Superb Parrot 6 – Swift Parrot 6 – Corben’s Long-eared Bat	Unlikely to increase in quality without active management. Spread of weeds and feral animals likely to persist and possibly spread, limiting persistence and further recovery of the community.
Offset calculator -Future area and quality with offset – Risk of loss with offset (%)	N/A	2	Offsets to be secured as part of project approvals. Under a recognised conservation mechanism in perpetuity - <i>NSW Nature Conservation Trust Act 2001</i> .
Offset calculator -Future area and quality with offset – Future quality with offset (1-10)	Moderate	8 – Box-Gum 8 – Superb Parrot 8 – Swift Parrot 8 – Corben’s Long-eared Bat	Active management including feral animal control, fencing and management of noxious and environmental weeds likely to increase quality of community and habitat attributes available to species including foraging, roosting and over time, potential breeding habitat. Potential for further rehabilitation and natural regeneration.

4. Offset comparisons

4.1 NSW BioBanking credit calculations

4.1.1 Offset package credit contribution

The biodiversity credits that are included in this offset strategy are presented in Table 9. The number and type of biodiversity credits have been determined with reference to:

- The biodiversity credit profile of the development site, which comprises the biodiversity credits that would be required to offset impacts arising from the project.
- The biodiversity credit profile of the biodiversity offset site, which comprises the biodiversity credits that would be generated if the offset site was set aside and managed for conservation in perpetuity.
- The biodiversity credit trading rules for BioBanking assessments presented in DECC (2009).
- The experience and assessor's use of judgement by GHD ecologists.
- Consultation with OEH on this project.

Ecosystem credits

The BBAM states that impacts of a development on biodiversity values must be offset by the retirement of biodiversity credits at the offset site determined in accordance with the offset rules. The offset rules state that ecosystem credits that are retired from an offset site are determined to be compatible with those required by impacts at the development site if a number of conditions are met, including that "the number of ecosystem credits obtained and retired from the site is equal to or greater than the number of credits required at the development site" (DECC 2009). The BioBanking ecosystem credit comparison between the development site and the biodiversity offset site is presented in Table 9.

The DECC (2009) ecosystem credit trading rules are presented below along with a comparison of the biodiversity credit profiles of the development site and the offset site.

1. *The number of ecosystem credits obtained and retired from the biobank site is equal to or greater than the number of credits required at the development site:*
 - a total of 237 ecosystem credits, minimum, are available at the biobank site, which is equal to the 237 ecosystem credits required for the development site. In addition, the Planning Agreement Areas require 92.4 hectares of offset, which would also be obtained from the site (the offsets in the PAA areas are not subject to the credit trading rules). Therefore condition one is met.
2. *The CMA subregion of the biobank site is the same as the subregion of the development site:*
 - The development site and biobank site are within the same CMA subregion therefore condition two is met.

3. *The vegetation types identified in the credit profile at the biobank site are the same as the vegetation types identified in the in the credit profile of the credits required at the development site:*
 - The vegetation types at the development site and biobank site are different, however, as they both classify as Box-Gum Woodland there is the ability to substitute the ecosystem credit types at the development site with ecosystem credits from an endangered ecological community. Therefore condition three is partially met.
4. *The vegetation formation identified in the credit profile at the biobank site is the same as the vegetation formation identified in the credit profile of the credits required at the development site:*
 - The ecosystem credits that would be traded between the development site and the biobank sites in this offset strategy are within the Grassy Woodlands vegetation formation. There is an additional vegetation formation available at the offset site, Dry Sclerophyll Forests (shrubby sub-formation), that would not require trading for the development site. Therefore condition four is met.
5. *The surrounding vegetation cover class identified in the credit profile at the biobank site is equal to, or greater than, the surrounding vegetation cover class in the credit profile of the credits required at the development site:*
 - the surrounding vegetation cover class percentages of ecosystem credits required at the development site (31-70%) are higher than the percentages at the biodiversity offset site (11-30%). Therefore condition five is not met.
6. *The patch size, including low condition class identified in the credit profile at the biobank site is equal to, or greater than, the patch size, including low condition class identified in the credit profile of the credits required at the development site:*
 - the patch size, including low condition vegetation of ecosystem credits required at the development site (>100 hectares) are matched by credits with equivalent patch sizes at the biobank site (> 100 hectares). Therefore condition six is met.

The partial inconsistency with conditions 3 reflects the inherent difficulty of identifying a viable biobank site or sites with the desired credit profile. The inconsistency with condition five is a function of the highly cleared agricultural landscape which occurs to the east, south and west of the offset site (though it is well connected to the north). The development site contains larger patches of remnant vegetation to the north and south. The biobanking scheme is intended to address this issue by providing for the trading of a wide range of biodiversity credits across multiple biobank sites via a register. However because the scheme is relatively new, only a limited range of biodiversity credits are available. Nonetheless, this offset strategy has partially offset all ecosystem credit types within the development site according to the strict application of the biodiversity credit trading rules and has fully offset all credits using the DECCW (2010) variation criteria.

Table 9 - Comparison between development site credits required and offset site credits

Vegetation type	Development ecosystem credits required	Biodiversity offset site credits generated	Credit balance	Source of credit balance
Grassy White Box woodland on well drained podsollic clay soils on hills in the NSW South Western Slopes Bioregion (MR561)	237	-	237 credit deficit	These credits would be traded with MR 560 or MR 643 credits as they are all classified as the endangered ecological community Box-Gum Woodland. This trade is allowed under the trading rules outlined in the credit profile.
Grassy White Box – Blakely's Red Gum – Yellow Box woodland of the NSW South Western Slopes Bioregion (MR 560)	0	2,355	2,355 credit surplus	Depending on which credits the MR561 are traded for, there may be a 2118 credit surplus instead of a 2355 credit surplus.
Mugga Ironbark – Inland Grey Box – Pine tall woodland of the NSW South Western Slopes Bioregion (MR 577)	0	102	102 credit surplus	N/A
White Box – White Cypress – Inland Grey Box woodland on the western slopes of NSW (MR 643)	0	371	371 credit surplus	Depending on which credits the MR561 are traded for, there may be a 134 credit surplus instead of a 371 credit surplus.
Total	237	2,828		

Species within ecosystem credits

As described in Section 3 and summarised in Table 9, the vegetation types and ecosystems within the offset site are similar to that within the development site given they both contain the endangered ecological community Box-Gum Woodland. This comparison is supported by the threatened species that were recorded in site surveys or are predicted to occur within the development and offset site as presented in Table 10.

A total of 13 threatened fauna species and one endangered population were identified in the development area during field surveys (GHD 2012, nghenvironmental 2013a and 2013b, WSP 2013, ARCUE 2013). One additional threatened fauna species was assumed to be present within the development site based on a 'possible' call analysis (Little Pied Bat *Chalinolobus picatus*) (WSP 2013).

None of the threatened fauna species recorded within the development area are of the type that require species credits within the BBAM (DECCW 2010; DECC 2009). All of these species, apart from four, are predicted to occur with ecosystem credits at the development site and all apart from three are also predicted to occur in ecosystem credits generated at the offset site as shown in Table 10. The Little Eagle, Scarlet Robin and Southern Myotis are not predicted to occur at either site, although all three were recorded at the development site during surveys. The Little Pied Bat, which was recorded based on a possible call analysis, is predicted to occur at the offset site but not the development site.

Table 10 - Comparison between development site and offset site recorded and predicted threatened species

Scientific name	Common name	TSC Act status	Development site		Offset site	
			Recorded	Predicted	Recorded	Predicted
BIRDS						
<i>Ninox connivens</i>	Barking Owl	V	No	Yes	No	Yes
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater	V	No	Yes	No	Yes
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	V	Yes	Yes	Yes	Yes
<i>Burhinus grallarius</i>	Bush Stone-curlew	E	No	Yes	No	Yes
<i>Stagonopleura guttata</i>	Diamond Firetail	V	Yes	Yes	Yes	Yes
<i>Petroica phoenicea</i>	Flame Robin	V	Yes	Yes	Yes	Yes
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	No	Yes	No	Yes
<i>Pachycephala inornata</i>	Gilbert's Whistler	V	No	No	No	Yes
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	V	Yes	Yes	No	Yes
<i>Hieraaetus morphnoides</i>	Little Eagle	V	Yes	No	No	No
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	Yes	Yes	Yes	Yes
<i>Grantiella picta</i>	Painted Honeyeater	V	No	Yes	No	Yes
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	No	Yes	No	Yes

Scientific name	Common name	TSC Act status	Development site		Offset site	
			Recorded	Predicted	Recorded	Predicted
<i>Petroica boodang</i>	Scarlet Robin	V	Yes	No	Yes	No
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	V	Yes	Yes	No	Yes
<i>Lophoictinia isura</i>	Square-tailed Kite	V	No	Yes	No	Yes
<i>Polytelis swainsonii</i>	Superb Parrot	V	Yes	Yes	Yes	Yes
<i>Lathamus discolor</i>	Swift Parrot	E	Yes	Yes	No	Yes
<i>Neophema pulchella</i>	Turquoise Parrot	V	No	Yes	No	Yes
MAMMALS						
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V	No	No	No	Yes
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	No	Yes	No	Yes
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	No	Yes	No	Yes
<i>Phascolarctos cinereus</i>	Koala	V	No	Yes	No	Yes
<i>Chalinobus picatus</i>	Little Pied Bat	V	Possible	No	No	Yes
<i>Myotis macropus</i>	Southern Myotis	V	Yes	No	No	No
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	No	Yes	No	Yes
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	Yes	Yes	No	Yes
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	Yes	Yes	No	Yes
REPTILES						
<i>Aprasia parapulchella</i>	Pink-tailed Worm-lizard	V	No	No	No	Yes
<i>Delma impar</i>	Striped Legless Lizard	V	No	No	No	Yes
INSECTS						
<i>Synemon plana</i>	Golden Sun Moth	E	No	Yes	No	Yes
<i>Swainsona sericea</i>	Silky Swainson-pea	V	No	No	No	Yes
<i>Swainsona recta</i>	Small Purple-pea	E	No	Yes	No	Yes

Species credits

All of the threatened species which are known to occur in the study area are ecosystem credit-type threatened species, so no species credits were required for the biobanking assessment.

4.2 NSW offset principles comparisons

The OEH principles for the use of biodiversity offsets in NSW outlines 13 principles that should be used when considering biodiversity impacts and appropriate offset requirements. Each principle and how the proposed offset site meets these principles are outlined below:

1. *Impacts must be avoided first by using prevention and mitigation measures.*
 - The project has been through a rigorous options analysis and the most appropriate route selected based on all environmental constraints. In addition, targeted mitigation measures for species, populations and ecological communities have been developed in the project Review of Environmental Factors (GHD 2013a) and Species Impact Statement (GHD 2013b).
2. *All regulatory requirements must be met.*
 - The proposed offset is for biodiversity offsets only to satisfy impacts under the NSW *Environmental Planning and Assessment Act 1979*.
3. *Offsets must never reward ongoing poor performance.*
 - The offset site will be purchased and managed by the Nature Conservation Trust. Their aim is to increase the biodiversity of property's through active management and would not deliberately degrade or mismanage the offset site.
4. *Offsets will complement other government programs.*
 - The offset site is consistent with other NSW government conservation programs that include conservation under the NSW *National Parks and Wildlife Act 1974*. The offset property would be conserved under the NSW *Nature Conservation Trust Act 2001*.
5. *Offsets must be underpinned by sound ecological principles.*
 - The impacts at the development site and the offset site have been quantified and measured using the OEH BBAM. The ecological principles of the BBAM were rigorously tested and measured prior to the implementation of the program.
6. *Offsets should aim to result in a net improvement in biodiversity over time.*
 - A targeted management action plan will be developed for the offset site by the NCT. The management action plan will aim to increase biodiversity of the site through active management including targeted pest animal and plant control.
7. *Offsets must be enduring – they must offset the impact of the development for the period that the impact occurs.*
 - The offset site would offset the impacts of the project in perpetuity. The purchase of the property is currently being approved (Appendix E).
8. *Offsets should be agreed prior to the impact occurring.*
 - The impacts of the project have not yet commenced and the offset site is currently being purchased. The offset site would be secured and agreed prior to impacts occurring at the development site.
9. *Offsets must be quantifiable – the impacts and benefits must be reliably estimated.*
 - NSW and Commonwealth offsets have been quantified in line with relevant offset policies as outlined in this report.
10. *Offsets must be targeted.*
 - The offset site has been selected based on its location and type of vegetation communities that it supports which are similar to the development site. In addition, the offset site supports a very similar range of threatened fauna species as known to occur at the development site (see Table 9 and Table 10).
11. *Offsets must be located appropriately.*
 - Offsets and development impacts are both located in Box-Gum Woodland and therefore have similar ecological characteristics (see Table 9 and Table 10).

12. *Offsets must be supplementary.*
 - The proposed offset site has not previously been used for conservation purposes. It is currently and previously been used for rural agricultural activities (eg grazing).
13. *Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or contracts.*
 - The consent conditions for the project are yet to be finalised but are likely to include auditing of the proposed offset site and the management action plan. This offset package will be enforced by the concurrence to be sought from the Office of Environment and Heritage for the Species Impact Statement (GHD 2013b) being prepared for the project.

4.3 Commonwealth offset comparisons

The EPBC Act offset policy states a suitable offset site must:

- Deliver a conservation outcome that improves or maintains the viability of the aspect of the environment protected under national environmental law affected by the project.
- Be built around direct offsets.
- Be proportional to the level of statutory protection that applies to the protected matter.
- Be of a size and scale proportionate to the residual impacts on the protected matter.
- Effectively account for and manage the risks of the offset not succeeding.
- Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs.
- Be efficient, effective, timely, transparent, scientifically robust and reasonable.
- Have transparent governance arrangements including being able to be readily measured, monitored audited and enforced

As outlined in, this offset strategy complies with all of the key principles set out in the EPBC Act *Environmental Offsets Policy* (DSEWPaC 2012).

Table 11 - Comparison of the EPBC offsets with the DSEWPaC (2012) offsetting policy

Policy for the use of environmental offsets	Attributes of offset strategy
<p>Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter</p>	<p>The offset site contains 176.4 hectares of Box-Gum Grassy Woodland of which only 110 hectares would be required to offset the development. This is also suitable offsets for the Superb Parrot, Swift Parrot and Corben's Long-eared Bat. Management of the site would improve the viability of these protected matters at the site.</p> <p>The site is also relatively large, with good connectivity to surrounding vegetation in the locality including the Murrumbidgee River to the north. With improved management of the sites, the viability of both the ecological communities and the individual threatened species populations they support will be maintained in perpetuity.</p> <p>The offset site places EPBC Act matters of high ecological value under conservation, through the use of a conservation covenant on title (i.e. NCT conservation covenant), in perpetuity.</p>

Policy for the use of environmental offsets	Attributes of offset strategy
	Management actions will be completed in accordance with the Management Actions Plan attached to the conservation covenant.
Suitable offsets must be built around direct offsets but may include other compensatory measures	<p>The offset would achieve 100 per cent of the offset requirement for Box-Gum Grassy Woodland, Superb Parrot, Swift Parrot and Corben's Long-eared Bat.</p> <p>The offset site will be conserved and managed in perpetuity under the NSW NCT Act achieving long term conservation outcomes for the above matters of NES as well as a number of other threatened fauna species listed under the EPBC Act.</p>
Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter	<p>The EPBC Act <i>Offsets Assessment Guide</i> was used to calculate the area required to offset the impacts of the project on Box-Gum Grassy Woodland, Superb Parrot, Swift Parrot and Corben's Long-eared Bat. The guide takes into consideration the conservation status of the protected matters under consideration when determining the offset requirement.</p> <p>The offset strategy has been prepared using the BioBanking methodology and accordingly complements OEH and the NSW Governments approach to biodiversity conservation.</p> <p>The BBAM methodology also operates using similar ecological principles as the EPBC Act and associated offsetting guidelines.</p>
Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter	The offset site would conserve 110 hectares of community for Box-Gum Grassy Woodland to offset the removal of 12.6 hectares of the community within the development site. The 110 hectares also includes offsets for the Superb Parrot (108 hectares), Swift Parrot (57.5 hectares) and Corben's Long-eared Bat (47.5 hectares).
Suitable offsets must effectively account for and manage the risks of the offset not succeeding	<p>The offset site would be secured under NCT conservation covenant that would ensure that the land is conserved and managed in perpetuity. The conservation covenant and management action plan provides for protection of the property, funding of management and monitoring of its condition in perpetuity.</p> <p>A conservation covenant is one of the strongest conservation covenants available on private land in NSW. However there are circumstances where additional approval from the NSW Minister for the Environment may overturn the covenant for mining rights and, potentially, significant infrastructure. However, mechanisms to ensure any impacts from these activities are, again, suitably offset as an addition to any offsetting activities required by a given project in its own right would occur.</p>
Suitable offsets must be additional to what is already required, determined by law or planning regulations or agreed to under schemes or programs	The offset site is currently not protected under any form of conservation agreement, planning regulations, conservation schemes or programs.

Policy for the use of environmental offsets	Attributes of offset strategy
<p>Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable</p>	<p>The offset strategy complements other government programs and biodiversity conservation initiatives, in general, by contributing to regional biodiversity security, habitat connectivity, managing weed and pest species and conservation of threatened ecological communities and threatened species habitat.</p>
<p>Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.</p>	<p>This offset package is enforced by the concurrence to be sought from the Office of Environment and Heritage for the Species Impact Statement being prepared for the project.</p> <p>The offset site would be monitored according to the requirements of the conservation covenant and management actions plan prepared for the site.</p>

5. Offset site management framework

5.1 Summary

This offset strategy for the project identifies a biodiversity offset site that will be formally titled and conserved under a NCT Act conservation covenant. To deliver the biodiversity outcomes required by a conservation covenant, the following biodiversity management framework would be implemented at the offset site:

- **Conservation** – A ‘conservation covenant’ would be placed over the offset site in perpetuity. This covenant extinguishes all potential future land uses other than exploration/mining rights.
- **Vegetation rehabilitation** – Existing vegetation would have a ‘targeted’ weed control program applied to improve ‘condition’ throughout the offset site. Revegetation activities would increase the extent of native vegetation, through time, of the offset site. It is recommended these works be completed within the first five to ten years of management of the offset site.
- **Maintenance and monitoring** – An annual maintenance and monitoring regime would be applied to the offset site in perpetuity to ensure improvements in ecological values are maintained.

5.2 Conservation covenant (under the NCT Act)

Entering into a covenant under the NCT Act places a conservation covenant over the land, regardless of zoning. The covenant extinguishes all land uses on private land other than those which help to conserve the natural values of the land. The estimated timeframe for completing the conservation covenant agreement for the biodiversity offset site is three months from land purchase.

5.3 Management actions

The following describes the actions that would likely be required for ongoing management of the offset site. A Management Action Plan (MAP), detailing rehabilitation activities and an associated management program, would be prepared and included in the final conservation covenant agreement.

Offset sites may have two types of management actions applied:

- Standard management actions.
- Site specific management actions.

The management actions applicable to the offset site are described below.

5.3.1 Standard management actions

Standard management actions are those actions required on offset sites to improve vegetation condition when entering into a conservation covenant. The standard management actions for all offset sites are:

- Management of grazing for conservation.
- Noxious weed control.
- Management of fire for conservation.
- Management of human disturbance.

- Retention of regrowth and remnant native vegetation.
- Retention of dead timber.
- Erosion control.
- Retention of rocks.

5.3.2 Site specific

Based on the habitat resources within the site and the suite of threatened species which are predicted to occur, the credit calculator nominates management actions that would be required to alleviate site-specific threats. Undertaking these actions is over and above the minimal requirements for an offset site. Additional management actions required at the biodiversity offset site to be conducted over a five year period are summarised below:

- Erection of new fencing to control stock
- Fox and/or cat and/or control
- Supplementary planting of native species via direct seeding/revegetation
- Short term total exclusion of domestic grazing at supplementary planting sites
- Environmental weed control via herbicide spray and targeted reduction in cover
- Feral and/or native herbivore control/exclusion (e.g. rabbit, hare, goats, deer etc).

The MAP will identify site specific vegetation rehabilitation and management actions appropriate for the biodiversity offset site which would be completed during the preparation of the conservation covenant agreement.

6. Conclusion

This offset strategy has been prepared and includes the purchase of an appropriate offset site to compensate for residual impacts arising from the project on threatened species and ecological communities listed under both State and Commonwealth legislation (see Appendix E). The offset site will be conserved and managed within the framework of a NCT Act conservation land title covenant.

The offset site contains about 298.3 hectares of native vegetation; of which 117.9 hectares is suitable to offset the impacts on TSC Act listed Box-Gum Woodland at the development site. Of the 117.9 hectares, 110 hectares are suitable to offset the impacts on the EPBC Act listing of the Box-Gum Grassy Woodland to achieve a 100 percent offset (as determined by the offsets assessment guide). The site will also achieve a 100 percent offset for the three other matters of NES that would be impacted by the development; the Superb Parrot, Swift Parrot and Corben's Long-eared Bat.

The offset site will achieve conservation outcomes within an area much larger than the development site. Local populations of native species, including threatened biota that will be affected by the project will directly benefit from the conservation and regeneration of degraded or cleared land into Box-Gum Woodland and other vegetation types within the offset site. The number of ecosystem credits (and area) obtained from the offset site is greater than the number of credits required at the development site. The offset site also contains suitable offsets for the Planning Agreement Area.

In addition the biodiversity offset site is consistent with the key principles of the EPBC Act offset policy as:

- It will deliver a conservation outcome that improves or maintains the viability of Box-Gum Grassy Woodland and habitat for Superb Parrot, Swift Parrot and Corben's Long-eared Bat.
- It comprises a 100 percent direct offset for matters of NES.
- Has been calculated using the offsets assessment guide which ensures that the offset is proportional to the level of statutory protection that applies to the protected matter.
- Will protect more than the required area of habitat for these matters of NES to fully offset the residual impacts of the project.
- Is efficient, effective, timely, transparent, scientifically robust and reasonable.
- Has transparent governance arrangements including being able to be readily measured, monitored audited and enforced.

Furthermore the offset site is dominated by intact native vegetation in good condition and includes a large area of the threatened Box-Gum Woodland community and includes habitat for a number of threatened species listed under both the TSC Act and EPBC Act. The majority of threatened fauna species predicted to occur in ecosystem credits associated with the development site are also predicted to occur at the biodiversity offset site.

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Appendices

Appendix A – Development site BioBanking credit reports

BioBanking credit report

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

Date of report: 11/07/2012

Time: 2:21:39PM

Tool version: 2.0

Development details

Proposal ID: 0050/2012/0257D
Proposal name: Kapooka bridge - clearing
Proposal address: Olympic Highway and Camp Access Road Wagga Wagga NSW 2650

Proponent name: Roads and Maritime Services
Proponent address: 1 Simmons Street Wagga Wagga NSW 2650
Proponent phone: 0437 892 489

Assessor name: Leigh Maloney
Assessor address: PO Box 6089 WAGGA WAGGA NSW 2650
Assessor phone: 6923 7416
Assessor accreditation: 0050

Improving or maintaining biodiversity

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

Red flag	Reason
Grassy White Box woodland on well drained podsolc clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)	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
 - Gang-gang Cockatoo Callocephalon fimbriatum
- Expert report
- Predicted threatened species not on site
 - Bush Stone-curlew Burhinus grallarius
 - Eastern Pygmy-possum Cercartetus nanus
 - Golden Sun Moth Synemon plana
 - Koala Phascolarctos cinereus
 - Painted Honeyeater Grantiella picta
 - Spotted-tailed Quoll Dasyurus maculatus
- Change threatened species response to gain (Tg value)

Ecosystem credits summary

Vegetation type	Area (ha)	Credits required	Red flag
Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)	4.70	237	Yes
Total	4.70	237	

Credit profiles

1. Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266), (MR561)

Number of ecosystem credits required	237
CMA sub-region	Upper Slopes - Murrumbidgee
Minimum percent native vegetation cover class	31-70%
Minimum adjacent remnant area class	>100 ha

Offset options - vegetation types	Offset options - CMA sub-regions
Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266), (MR561)	Upper Slopes - Murrumbidgee
Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (Benson 277), (CW112)	Orange - Central West
White Box grassy woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266), (CW216)	Upper Slopes - Lachlan
White Box grassy woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266), (LA219)	Upper Slopes - Central West
Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (Benson 277), (LA120)	
Blakely's Red Gum - Yellow Box grassy woodland of the NSW South Western Slopes Bioregion (Benson 277), (MR528)	
Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266), (MU551)	

BioBanking Credit Calculator

Ecosystem credits

Proposal ID : 0050/2012/0257D
 Proposal name : Kapooka bridge - clearing
 Assessor name : Leigh Maloney
 Assessor accreditation number : 0050
 Tool version : 1.1
 Report created : 11/07/2012 14:20

Assessment circle name	Landsc ape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for bio diversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
Circle 1	14.00	MR561_Moderate/Good	Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)	Moderate/Good	Yes	MZ1	4.70	46.88	0.00	46.88	72	237	Barking Owl	61.90	0.33	237

BioBanking Credit Calculator

Species credits

Proposal ID :

Proposal name :

Assessor name :

Assessor accreditation number :

Tool version : 1.1

Report created : 11/07/2012 14:20

Scientific name	Common name	Species TG value	Identified population?	Can Id. popn. be offset?	Area / number of loss	Negligible loss	Red flag status	Number of credits
No								

BioBanking Credit Calculator

Threatened species predicted on site

Proposal ID : 0050/2012/0257D
Proposal name : Kapooka bridge - clearing
Assessor name : Leigh Maloney
Assessor accreditation number : 0050
Tool version : 1.1
Report created : 11/07/2012 14:19

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common name	Scientific name	Vegetation type(s)
Barking Owl	<i>Ninox connivens</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Diamond Firetail	<i>Stagonopleura guttata</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Flame Robin	<i>Petroica phoenicea</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)

Common name	Scientific name	Vegetation type(s)
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Little Lorikeet	<i>Glossopsitta pusilla</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Regent Honeyeater	<i>Xanthomyza phrygia</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Speckled Warbler	<i>Pyrrholaemus saggitatus</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Squirrel Glider	<i>Petaurus norfolcensis</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Superb Parrot	<i>Polytelis swainsonii</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Swift Parrot	<i>Lathamus discolor</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Turquoise Parrot	<i>Neophema pulchella</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	MR561 - Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)

BioBanking Credit Calculator

Threatened species requiring survey

Proposal ID : 0050/2012/0257D
Proposal name : Kapooka bridge - clearing
Assessor name : Leigh Maloney
Assessor accreditation number : 0050
Tool version : 1.1
Report created : 11/07/2012 14:18

List of species requiring survey

Common name	Scientific name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gang-gang Cockatoo	Callocephalon fimbriatum	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Small Purple-pea	Swainsona recta	N	N	N	N	N	N	N	N	Y	Y	Y	N
Square-tailed Kite	Lophoictinia isura	Y	Y	Y	N	N	N	N	N	Y	Y	Y	Y

BioBanking Credit Calculator

Vegetation zones requiring transects/plots survey

Proposal ID : 0050/2012/0257D
Proposal name : Kapooka bridge - clearing
Assessor name : Leigh Maloney
Assessor accreditation number : 0050
Tool version : 1.1
Report created : 11/07/2012 14:19

Vegetation zone name : MR561_Moderate/Good

Vegetation type: Grassy White Box woodland on well drained podsolic clay soils on hills in the NSW South Western Slopes Bioregion (Benson 266)
Vegetation condition: Moderate/Good **Ancillary code:** MR561
Total area of zone (ha): 4.70 **Number of TS subzones in the zone:** 1
Minimum number of survey transects/plots required within the zone: 3

Appendix B – Offset site BioBanking credit reports

BioBanking Credit Calculator



Office of
Environment
& Heritage

BioBanking credit report

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

Date of report: 1/10/2013

Time: 12:11:05PM

Tool version: 2.0

Biobank details

Proposal ID: 0050/2013/0863B
Proposal name: Kapooka bridge offset
Proposal address: Borambola NSW 2650

Proponent name: Roads and Maritime Services
Proponent address: 1 Simmons Street Wagga Wagga NSW 2650
Proponent phone: 111111

Assessor name: Leigh Maloney
Assessor address: PO Box 6089 WAGGA WAGGA NSW 2650
Assessor phone: 6923 7416
Assessor accreditation: 0050

Additional information required for approval:

- Use of local benchmark
- Expert report
- Change threatened species response to gain (Tg value)

Ecosystem credits summary

Vegetation type	Area (ha)	Credits required	Red flag
White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)	9.20	88	No
White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)	32.10	283	No
Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)	135.88	1,322	No
Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)	10.90	102	No
Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)	93.70	889	No
Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)	16.49	144	No
Total	298.27	2,828	

Credit profiles

1. Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282), (MR560)

Number of ecosystem credits required	889
CMA sub-region	Upper Slopes - Murrumbidgee
Minimum percent native vegetation cover class	11-30%
Minimum adjacent remnant area class	

2. Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282), (MR560)

Number of ecosystem credits required	1,466
CMA sub-region	Upper Slopes - Murrumbidgee
Minimum percent native vegetation cover class	11-30%
Minimum adjacent remnant area class	>100 ha

3. White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267), (MR643)

Number of ecosystem credits required	88
CMA sub-region	Upper Slopes - Murrumbidgee
Minimum percent native vegetation cover class	11-30%
Minimum adjacent remnant area class	

4. White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267), (MR643)

Number of ecosystem credits required	283
CMA sub-region	Upper Slopes - Murrumbidgee
Minimum percent native vegetation cover class	11-30%
Minimum adjacent remnant area class	>100 ha

5. Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217), (MR577)

Number of ecosystem credits required	102
CMA sub-region	Upper Slopes - Murrumbidgee
Minimum percent native vegetation cover class	11-30%
Minimum adjacent remnant area class	>100 ha

Species credits

Additional management actions

Additional management actions are required for:

Vegetation type or threatened species	Management action details
Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)	Cat and/or Fox control
Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)	Exclude miscellaneous feral species
Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)	Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)
Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)	Cat and/or Fox control
Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)	Exclude miscellaneous feral species
Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)	Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)
White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)	Cat and/or Fox control
White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)	Exclude miscellaneous feral species
White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)	Feral and/or native herbivore control/ exclusion (eg rabbit, goats, deer etc)

BioBanking Credit Calculator

Ecosystem credits

Proposal ID : 0050/2013/0863B
 Proposal name : Kapooka bridge offset
 Assessor name : Leigh Maloney
 Assessor accreditation number : 0050
 Tool version : v2.1
 Report created : 22/10/2013 11:26

Assessment circle name	Landsc ape score	TS subzone number	Vegetation zone name	Vegetation type name	Condition	Management zone name	Management zone area	Current site value	Future site value	Gain in site value	Total credit created for management zone
One	13.00	1	MR560_Low	Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)	Low	1	93.70	31.77	53.56	21.79	889
One	13.00	2	MR560_Moderate/Good_Poor	Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)	Moderate/Good_Poor	1	16.49	36.46	54.69	18.23	144
One	13.00	3	TBA	Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)	Moderate/Good_Medium	1	135.88	52.43	73.09	20.66	1,322
One	13.00	4	MR577_Moderate/Good_Medium	Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)	Moderate/Good_Medium	1	10.90	60.42	78.99	18.57	102
One	13.00	5	MR643_Low	White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)	Low	1	9.20	25.52	48.09	22.57	88
One	13.00	7	MR643_Moderate/Good_Medium	White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)	Moderate/Good_Medium	1	32.10	55.73	72.40	16.67	283

BioBanking Credit Calculator

Species credits

Proposal ID :

Proposal name :

Assessor name :

Assessor accreditation number :

Tool version : v2.1

Report created : 22/10/2013 11:26

Scientific name	Common name	Species TG value	Biobank on identified population?	Number Units found?	Number of credits
			No		

BioBanking Credit Calculator

Threatened species predicted on site

Proposal ID : 0050/2013/0863B
Proposal name : Kapooka bridge offset
Assessor name : Leigh Maloney
Assessor accreditation number : 0050
Tool version : v2.1
Report created : 22/10/2013 10:48

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common name	Scientific name	Vegetation type(s)
Barking Owl	Ninox connivens	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)

Common name	Scientific name	Vegetation type(s)
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Bush Stone-curlew	<i>Burhinus grallarius</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Diamond Firetail	<i>Stagonopleura guttata</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)
Eastern Pygmy-possum	<i>Cercartetus nanus</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)

Common name	Scientific name	Vegetation type(s)
Flame Robin	<i>Petroica phoenicea</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)
		MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)
		MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Gilbert's Whistler	<i>Pachycephala inornata</i>	MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)
		MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Golden Sun Moth	<i>Synemon plana</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)
		MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)
		MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Koala	<i>Phascolarctos cinereus</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)
		MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)
Little Lorikeet	<i>Glossopsitta pusilla</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)

Common name	Scientific name	Vegetation type(s)
Little Lorikeet	<i>Glossopsitta pusilla</i>	MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Little Pied Bat	<i>Chalinolobus picatus</i>	MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Painted Honeyeater	<i>Grantiella picta</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Regent Honeyeater	<i>Xanthomyza phrygia</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Speckled Warbler	<i>Pyrholaemus saggitatus</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)

Common name	Scientific name	Vegetation type(s)
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Squirrel Glider	<i>Petaurus norfolcensis</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Superb Parrot	<i>Polytelis swainsonii</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Swift Parrot	<i>Lathamus discolor</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Turquoise Parrot	<i>Neophema pulchella</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)

Common name	Scientific name	Vegetation type(s)
Turquoise Parrot	<i>Neophema pulchella</i>	MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	MR560 - Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282) MR577 - Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217) MR643 - White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)

BioBanking Credit Calculator

Threatened species requiring survey

Proposal ID : 0050/2013/0863B
Proposal name : Kapooka bridge offset
Assessor name : Leigh Maloney
Assessor accreditation number : 0050
Tool version : v2.1
Report created : 22/10/2013 10:38

List of species requiring survey

Common name	Scientific name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Brush-tailed Phascogale	Phascogale tapoatafa	N	N	N	N	N	N	N	N	N	N	N	N
Gang-gang Cockatoo	Callocephalon fimbriatum	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Pink-tailed Worm-lizard	Aprasia parapulchella	Y	Y	N	N	N	N	N	N	Y	Y	Y	Y
Silky Swainson-pea	Swainsona sericea	N	N	N	N	N	N	N	N	Y	Y	Y	Y
Small Purple-pea	Swainsona recta	N	N	N	N	N	N	N	N	Y	Y	Y	N
Square-tailed Kite	Lophoictinia isura	Y	Y	Y	N	N	N	N	N	Y	Y	Y	Y
Striped Legless Lizard	Delma impar	N	N	N	N	N	N	N	N	Y	Y	Y	Y

BioBanking Credit Calculator

Vegetation zones requiring transects/plots survey

Proposal ID : 0050/2013/0863B
Proposal name : Kapooka bridge offset
Assessor name : Leigh Maloney
Assessor accreditation number : 0050
Tool version : v2.1
Report created : 22/10/2013 11:24

Vegetation zone name : MR560_Low

Vegetation type: Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)
Vegetation condition: Low **Ancillary code:** MR560
Total area of zone (ha): 93.70 **Number of TS subzones in the zone:** 1
Minimum number of survey transects/plots required within the zone: 3

Vegetation zone name : MR560_Moderate/Good_Poor

Vegetation type: Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)
Vegetation condition: Moderate/Good_Poor **Ancillary code:** MR560
Total area of zone (ha): 16.49 **Number of TS subzones in the zone:** 1
Minimum number of survey transects/plots required within the zone: 3

Vegetation zone name : TBA

Vegetation type: Grassy White Box - Blakely's Red Gum - Yellow Box woodland of the NSW South Western Slopes Bioregion (Benson 282)
Vegetation condition: Moderate/Good_Medium **Ancillary code:** MR560
Total area of zone (ha): 135.88 **Number of TS subzones in the zone:** 1
Minimum number of survey transects/plots required within the zone: 6

Vegetation zone name : MR577_Moderate/Good_Medium

Vegetation type: Mugga Ironbark - Inland Grey Box - Pine tall woodland of the NSW South Western Slopes Bioregion (Benson 217)

Vegetation condition: Moderate/Good_Medium **Ancillary code:** MR577

Total area of zone (ha): 10.90 **Number of TS subzones in the zone:** 1

Minimum number of survey transects/plots required within the zone: 3

Vegetation zone name : MR643_Low

Vegetation type: White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)

Vegetation condition: Low **Ancillary code:** MR643

Total area of zone (ha): 9.20 **Number of TS subzones in the zone:** 1

Minimum number of survey transects/plots required within the zone: 2

Vegetation zone name : MR643_Moderate/Good_Medium

Vegetation type: White Box - White Cypress Pine - Inland Grey Box woodland on the western slopes of NSW (Benson 267)

Vegetation condition: Moderate/Good_Medium **Ancillary code:** MR643

Total area of zone (ha): 32.10 **Number of TS subzones in the zone:** 1

Minimum number of survey transects/plots required within the zone: 4

Appendix C – EPBC offset assessment guide results for matter of NES

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	Box-Gum Grassy Woodland
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	
<i>Ecological communities</i>						
Area of community	Yes	Permanent removal of 12.6 hectares of Box-Gum Grassy Woodland that includes derived grassland already in high condition and part of an offset area.	Area	12.6	Hectares	GHD ecological assessment for REF. Vegetation mapping based on vegetation quadrats undertaken in the study area to be permanently impacted.
			Quality	7	Scale 0-10	
			Total quantum of impact	8.82	Adjusted hectares	
<i>Threatened species habitat</i>						
Area of habitat	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species</i>						
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					
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													
<i>Ecological Communities</i>																													
Area of community	Yes	8.82	Adjusted hectares	None yet identified - this scenario site includes moderate condition vegetation that already meets the definition of EPBC Box Gum Gum Woodland with some understorey. Targeted management actions would have more benefits than an offset site already in high condition.	Risk-related time horizon (max. 20 years)	20	Start area (hectares)	110	Risk of loss (% without offset)	10%	Risk of loss (% with offset)	2%	Raw gain	8.80	Confidence in result (%)	90%	Adjusted gain	7.92	Net present value (adjusted hectares)	2.12	8.87	100.57%	Yes	\$0.00					
					Future area without offset (adjusted hectares)	99.0	Future area with offset (adjusted hectares)	107.8	Raw gain	3.00	Confidence in result (%)	90%	Adjusted gain	2.70	Net present value (adjusted hectares)	0.72													
					Time until ecological benefit	20	Start quality (scale of 0-10)	5	Future quality without offset (scale of 0-10)	5	Future quality with offset (scale of 0-10)	8																	
<i>Threatened species habitat</i>																													
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)		Raw gain		Confidence in result (%)		Adjusted gain		Net present value (adjusted hectares)										
					Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0	Raw gain		Confidence in result (%)		Adjusted gain		Net present value (adjusted hectares)														
					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)																		
<i>Threatened species</i>																													
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																												
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	8.82	8.87	100.57%	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	Corben's Long-eared Bat
EPBC Act status	Vulnerable
Annual probability of extinction <small>Based on IUCN category definitions</small>	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	
<i>Ecological communities</i>						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species habitat</i>						
Area of habitat	Yes	Variable feeding and roosting habitat of which 14.2 hectares is suitable for Corben's Long-eared Bat. This includes mostly White Box.	Area	14.2	Hectares	GHD ecological assessment for REF. Vegetation mapping based on vegetation quadrats undertaken in the study area to be permanently impacted.
			Quality	7	Scale 0-10	
			Total quantum of impact	9.94	Adjusted hectares	
<i>Threatened species</i>						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source	
Number of features <small>e.g. Nest hollows, habitat trees</small>	No					
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No					
Birth rate <small>e.g. Change in nest success</small>	No					
Mortality rate <small>e.g. Change in number of road kills per year</small>	No					
Number of individuals <small>e.g. Individual plants/animals</small>	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				
<i>Ecological Communities</i>																				
Area of community	No					Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Future area without offset (adjusted hectares)	0.0	Risk of loss (%) with offset	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)											
<i>Threatened species habitat</i>																				
Area of habitat	Yes	9.94	Adjusted hectares	None yet identified - this scenario site includes high condition vegetation that includes both potential roosting and feeding habitat that would only improve the quality score marginally with targeted management actions	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	47.5	Risk of loss (%) without offset	10%	Risk of loss (%) with offset	2%	3.80	90%	3.42	3.29	10.02	100.83%	Yes	
						Time until ecological benefit	20	Start quality (scale of 0-10)	6	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	8	2.00	90%	1.80	1.73			
<i>Threatened species</i>																				
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 <small>e.g. Nest hollows, habitat trees</small>	No																			
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No																			
Birth rate <small>e.g. Change in nest success</small>	No																			
Mortality rate <small>e.g. Change in number of road kills per year</small>	No																			
Number of individuals <small>e.g. Individual plants/animals</small>	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	
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	9.94	10.02	100.83%	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	Superb Parrot
EPBC Act status	Vulnerable
Annual probability of extinction <small>Based on IUCN category definitions</small>	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	
<i>Ecological communities</i>						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species habitat</i>						
Area of habitat	Yes	Variable roosting habitat with some hollow bearing trees and paddock trees across 32.5 hectares of proposed bridge. This includes 18.6 hectares of new growth shrub and introduced grassland areas as Superb Parrots are known to roost in.	Area	32.5	Hectares	GHD ecological assessment for REF. Vegetation mapping based on vegetation quadrats undertaken in the study area to be permanently impacted.
			Quality	7	Scale 0-10	
			Total quantum of impact	22.75	Adjusted hectares	
<i>Threatened species</i>						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source	
Number of features <small>e.g. Nest hollows, habitat trees</small>	No					
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No					
Birth rate <small>e.g. Change in nest success</small>	No					
Mortality rate <small>e.g. Change in number of road kills per year</small>	No					
Number of individuals <small>e.g. Individual plants/animals</small>	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				
<i>Ecological Communities</i>																				
Area of community	No					Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Future area without offset (adjusted hectares)	Risk of loss (%) with offset	Future area with offset (adjusted hectares)									
						Time until ecological benefit	Start quality (scale of 0-10)	Future area without offset (scale of 0-10)	Future quality with offset (scale of 0-10)											
<i>Threatened species habitat</i>																				
Area of habitat	Yes	22.75	Adjusted hectares	None yet identified - this scenario site includes moderate/good condition vegetation that includes both potential breeding, roosting and feeding habitat	20	Start area (hectares)	108	Risk of loss (%) without offset	10%	Risk of loss (%) with offset	2%	8.64	90%	7.78	7.47	22.79	100.17%	Yes		
						Time until ecological benefit	20	Start quality (scale of 0-10)	6	Future area without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	8	2.00	90%	1.80	1.73			
<i>Threatened species</i>																				
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 <small>e.g. Nest hollows, habitat trees</small>	No																			
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No																			
Birth rate <small>e.g. Change in nest success</small>	No																			
Mortality rate <small>e.g. Change in number of road kills per year</small>	No																			
Number of individuals <small>e.g. Individual plants/animals</small>	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	
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	22.75	22.79	100.17%	Yes	\$0.00	N/A	\$0.00
Area of community	0				\$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	Swift Parrot
EPBC Act status	Endangered
Annual probability of extinction <small>Based on IUCN category definitions</small>	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	
<i>Ecological communities</i>						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
<i>Threatened species habitat</i>						
Area of habitat	Yes	Variable feeding and roosting habitat of which 14.2 hectares is suitable for Swift Parrot. This includes mostly White Box with a small amount of planted Lemon Scented Gum	Area	14.2	Hectares	GHD ecological assessment for REF. Vegetation mapping based on vegetation quadrats undertaken in the study area to be permanently impacted.
			Quality	7	Scale 0-10	
			Total quantum of impact	9.94	Adjusted hectares	
<i>Threatened species</i>						
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source	
Number of features <small>e.g. Nest hollows, habitat trees</small>	No					
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No					
Birth rate <small>e.g. Change in nest success</small>	No					
Mortality rate <small>e.g. Change in number of road kills per year</small>	No					
Number of individuals <small>e.g. Individual plants/animals</small>	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				
<i>Ecological Communities</i>																				
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)
<i>Threatened species habitat</i>																				
Area of habitat	Yes	9.94	Adjusted hectares	None yet identified - this scenario site includes moderate condition vegetation that includes both potential roosting and feeding habitat that has a good opportunity to increase site quality with targeted management actions	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	57.5	Risk of loss (%) without offset	10%	Risk of loss (%) with offset	2%	4.60	90%	4.14	3.26	9.95	100.07%	Yes	
									Future area without offset (adjusted hectares)	51.8	Future area with offset (adjusted hectares)	56.4								
									Time until ecological benefit	20	Start quality (scale of 0-10)	6								Future quality without offset (scale of 0-10)
<i>Threatened species</i>																				
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 <small>e.g. Nest hollows, habitat trees</small>	No																			
Condition of habitat <small>Change in habitat condition, but no change in extent</small>	No																			
Birth rate <small>e.g. Change in nest success</small>	No																			
Mortality rate <small>e.g. Change in number of road kills per year</small>	No																			
Number of individuals <small>e.g. Individual plants/animals</small>	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	9.94	9.95	100.07%	Yes	\$0.00	N/A	\$0.00
Area of community	0				\$0.00		\$0.00
					\$0.00	\$0.00	\$0.00

Appendix D – Offset site flora species list

FLORA LIST

* Introduced species

✓ Species present

All numbers are per cent cover

r Less than one per cent cover, few individuals

+ Less than one per cent cover, numerous individuals

Scientific name	Common name	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
<i>Acacia genistifolia</i>	Early Wattle						5	r		r				
<i>Acetosella vulgaris</i> *	Sheep Sorrell							+						
<i>Aira cupaniana</i> *	Silvery Hairgrass	+			+	+	+	+	30	5			10	+
<i>Allocasuarina verticillata</i>	Drooping Sheoak												r	r
<i>Alternanthera nana</i>		+												
<i>Anagallis arvensis</i> *	Scarlet Pimpernel	5		+	1	10	+	+	r	+		+	2	+
<i>Aphanes australiana</i>				r						r				
<i>Arctotheca calendula</i> *	Capeweed	20	5	10	+	20	+	+	+	r	10	20	5	r
<i>Aristida jerichoensis</i>	Jericho Wiregrass				5									
<i>Aristida ramosa</i>	Purple Wiregrass	1			5	3	5			5				
<i>Arthropodium minus</i>	Small Vanilla Lily	+			+	+	+	+	+	+			+	+
<i>Asperula conferta</i>	Common Woodruff				r									
<i>Austrostipa densiflora</i>	A Speargrass	1	1		20	5	5	5	+	5		r	10	40
<i>Austrostipa scabra</i>	Speargrass			1	10	+	+		+	10		+	10	

Scientific name	Common name	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
<i>Avena barbata</i> *	Bearded Oats										40	30		
<i>Avena sp.</i> *						r								
<i>Bothriochloa macra</i>	Red Grass			r										
<i>Brachychiton populneus</i>	Kurrajong		r											
<i>Brachyscome diversifolia</i> var. <i>diversifolia</i>	Large-headed Daisy													+
<i>Briza maxima</i> *	Quaking Grass								+	r				
<i>Briza minor</i> *	Shivery Grass	r			r	r		+	5	+			+	+
<i>Bromus diandrus</i> *	Great Brome		10											
<i>Bromus hordeaceus</i> *	Soft Brome										r			
<i>Bulbine bulbosa</i>	Bulbine Lily								+					
<i>Callitris glaucophylla</i>	White Cypress Pine				r		r							
<i>Calochilus robertsonii</i>	Purplish Beard Orchid							r						
<i>Calotis hispidula</i>	Bogan Flea	r												
<i>Carduus nutans</i> *	Nodding Thistle											+	r	
<i>Centaurea calcitrapa</i> *	Star Thistle						r							
<i>Cerastium glomeratum</i> *	Mouse-ear Chickweed		1					+	r	r	+			
<i>Cheilanthes austrotenuifolia</i>	Rock Fern								+					
<i>Cheilanthes distans</i>	Bristly Cloak Fern	+												r
<i>Cheilanthes sieberi</i>	Poison Rock Fern	1	+		+	+	+	+	+	+		+	+	+

Scientific name	Common name	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
<i>Cicendia quadrangularis</i> *	Oregon Timwort	r					+		+					
<i>Cirsium vulgare</i> *	Spear Thistle	r												
<i>Convolvulus angustissimus</i> subsp. <i>angustissimus</i>					r									
<i>Cotula australis</i>	Common Cotula							+						
<i>Crassula colorata</i>		1		1		+				+			+	
<i>Crassula decumbens</i> var. <i>decumbens</i>				r										
<i>Cynoglossum australe</i>	Australian Hound's-tongue	r												
<i>Daucus glochidiatus</i>	Australian Carrot	3			1	r	+	+	5				+	+
<i>Dichondra repens</i>	Kidney Weed	r	+	1						+		+		
<i>Dichopogon strictus</i>	Chocolate Lily				r	+	r	+	+				r	
<i>Dillwynia sericea</i>	Showy Parrot-pea						r							
<i>Drosera peltata</i>							+	+	+	+				
<i>Echium plantagineum</i> *	Paterson's Curse		5	12	r						5	10		
<i>Einadia nutans</i> subsp. <i>nutans</i>	Climbing Saltbush			r				r						r
<i>Elymus scaber</i>	Common Wheat-grass	+												
<i>Eragrostis cilianensis</i> *	Stinkgrass			r										
<i>Erodium botrys</i> *	Long Storksbill			4							2	+		

Scientific name	Common name	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
<i>Erodium crinitum</i>	Blue Storksbill			r										
<i>Erodium moschatum</i> *	Musky Crowfoot			r										
<i>Eucalyptus albens</i>	White Box		1	1					10	15			r	10
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	7			10	5	3	r	10			2	15	2
<i>Eucalyptus macrorhyncha</i>	Red Stringbark							10						
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark						3	5						
<i>Galium gaudichaudii</i>	Rough Bedstraw	r												
<i>Geranium retrorsum</i>	Common Cranesbill				r			+	+	+		+	+	
<i>Geranium solanderi</i>	Native Geranium		+					+						+
<i>Glycine clandestina</i>					+			+	+			+	+	
<i>Glossodia major</i>	Waxlip Orchid							+						
<i>Gonocarpus elatus</i>		2			3	2	+	+	+	2		+	+	+
<i>Gonocarpus tetragynus</i>		1							r	+				
<i>Goodenia hederacea</i>	Forest Goodenia				+		+	+		+				
<i>Haloragis</i> sp.			r											
<i>Hibbertia obtusifolia</i>	Hoary Guinea Flower						r	r						
<i>Hordeum leporinum</i> *	Barley Grass		10	8							40	10		
<i>Hydrocotyle foveolata</i>	Yellow Pennywort						+	+	+				+	+
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort							2						
<i>Hypericum gramineum</i>	Small St John's Wort		3				r							

Scientific name	Common name	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
<i>Hypericum perforatum</i> *	St John's Wort			2							+	+	+	
<i>Hypochaeris glabra</i> *	Smooth Catsear	1			5	20	3	+	20	+		5	10	2
<i>Hypochaeris radicata</i> *	Catsear	1	2	1								r		
<i>Indigofera australis</i>	Australian Indigo							+						
<i>Lissanthe strigosa</i>	Peach Heath	r			r		+	r	r	r				
<i>Lolium rigidum</i> *	Wimmera Ryegrass	2	10	2										
<i>Luzula densiflora</i>								+	+					
<i>Marrubium vulgare</i> *	White Horehound		1	r										
<i>Microlaena stipoides</i>	Weeping Grass		2											
<i>Microseris lanceolata</i>	Yam Daisy						1	+						+
<i>Microtis unifolia</i>	Common Onion Orchid						r							
<i>Moenchia erecta</i> *	Erect Chickweed							+						
<i>Oxalis corniculata</i> *		r												
<i>Oxalis perennans</i>					r	r				+		+		
<i>Panicum effusum</i>	Hairy Panic							r						
<i>Petrorhagia nanteuilii</i> *	Proliferous Pink	+			r	+		+					r	r
<i>Picris angustifolia</i>								r						
Poaceae*					+	+	r	+	+					
<i>Poa annua</i> *	Winter Grass				+	+				+	5	10		
<i>Ranunculus lappaceus</i>	Common Buttercup	r							+					

Scientific name	Common name	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
<i>Romulea rosea</i> *	Onion Grass	+	1					r	+					
<i>Rumex brownii</i>	Swamp Dock		+	+					r	r	+	+		
<i>Rytidosperma</i> sp.	Wallaby Grass								r	+				
<i>Senecio quadridentatus</i>	Cotton Fireweed								r					
<i>Sherardia arvensis</i> *	Field Madder				r	r	+					r		
<i>Sida corrugata</i>	Corrugated Sida							r						
<i>Silene gallica</i> var. <i>gallica</i> *													+	
<i>Sonchus oleraceus</i> *	Common Sowthistle	+			r				r	r				+
<i>Stellaria media</i> *	Chickweed							+	+					
<i>Stuartina muelleri</i>	Spoon Cudweed						+	+		r			r	r
<i>Stypandra glauca</i>	Nodding Blue Lily	r			+	+	10	+	20	r			5	20
<i>Thysanotus patersonii</i>	Twining Fringe Lily						r							r
<i>Tricoryne elatior</i>	Yellow Autumn-lily	r						r	+					
<i>Trifolium angustifolium</i> *	Narrow-leaved Clover				+									
<i>Trifolium arvense</i> *	Haresfoot Clover	+	1	2	+	+		+	+					
<i>Trifolium campestre</i> *	Hop Clover			3										
<i>Trifolium glomeratum</i> *	Clustered Clover	1												
<i>Trifolium repens</i> *	White Clover				+	+		+	+	+	5	10	+	+
<i>Trifolium subterraneum</i> *	Subterranean Clover		2	2										
<i>Triptilodiscus pygmaeus</i>	Common Sunray	2			+		+	r		+			+	

Scientific name	Common name	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
<i>Vittadinia cuneata</i>	Fuzzweed										r			
<i>Vulpia bromoides</i> *	Squirrel-tail Fescue	1		2										
<i>Vulpia muralis</i> *							5	20	+	5		10	2	
<i>Wahlenbergia communis</i>	Tufted Bluebell	1												
<i>Wahlenbergia gracilentata</i>	Annual Bluebell				+		+							+
<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	r												
<i>Wurmbea dioica</i>	Early Nancy	+			+			+	+				r	
<i>Xerochrysum viscosum</i>	Sticky Everlasting	+	r							r				

Scientific name	Common name	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24	P25
Caryophyllaceae*		r											
<i>Cerastium glomeratum</i> *	Mouse-ear Chickweed	+	+	+	+	+	+	r					
<i>Cheilanthes distans</i>	Bristly Cloak Fern							r					
<i>Cheilanthes sieberi</i>	Poison Rock Fern	+	+		+	+		+	+	+	+	+	+
<i>Cirsium vulgare</i> *	Spear Thistle							r					
<i>Cotula australis</i>	Common Cotula					+					+		
<i>Crassula colorata</i>		+			+	+		+	+	+			+
<i>Cymbonotus preissianus</i>	Austral Bears' Ear				r								
<i>Daucus glochidiatus</i>	Australian Carrot	+			+			+			+		+
<i>Dichondra repens</i>	Kidney Weed	+	+		+	+							
<i>Dichopogon strictus</i>	Chocolate Lily	r						r	+	+		r	
<i>Drosera peltata</i>		+										+	
<i>Echium plantagineum</i> *	Paterson's Curse			5			20	r					
<i>Erodium botrys</i> *	Long Storksbill		+	+	r		+						
<i>Erodium moschatum</i> *	Musky Crowfoot						+						
<i>Eucalyptus albens</i>	White Box	5			2			5	5	10	3	2	
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	10	3		3	20		10	r		5	10	10
<i>Geranium retrorsum</i>	Common Cranesbill	+	+			+		+	+	+		+	
<i>Geranium solanderi</i>	Native Geranium	+	+										
<i>Glycine clandestina</i>		+				r				r			

Scientific name	Common name	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24	P25
<i>Poa annua</i> *	Winter Grass		5	20	+	5	20	+		+	+	5	+
<i>Ranunculus lappaceus</i>	Common Buttercup	+											
<i>Rumex brownii</i>	Swamp Dock	r	+	+	+	+	+			+			
<i>Rytidosperma</i> sp.	Wallaby Grass								+	5			+
<i>Senecio quadridentatus</i>	Cotton Fireweed					r						r	
<i>Sherardia arvensis</i> *	Field Madder	+	+	+	+	+		+				+	
<i>Silene gallica</i> *								r			r	r	+
<i>Sonchus oleraceus</i> *	Common Sowthistle	+				+		r	r	r	r		
<i>Stellaria media</i> *	Chickweed	+	+	+		+							
<i>Stuartina muelleri</i>	Spoon Cudweed							r	r				+
<i>Stypandra glauca</i>	Nodding Blue Lily							2	2	r	r		+
<i>Thysanotus patersonii</i>	Twining Fringe Lily								r				
<i>Trifolium angustifolium</i> *	Narrow-leaved Clover									+	+		+
<i>Trifolium arvense</i> *	Haresfoot Clover	+			+	+		+	+	+	5		+
<i>Trifolium dubium</i> *	Yellow Suckling Clover				+			+	+				
<i>Trifolium repens</i> *	White Clover	+	+		+	3	+	+		+	+	+	+
<i>Triptilodiscus pygmaeus</i>	Common Sunray	r						+			+		+
<i>Vulpia muralis</i> *		5	10	20	+				+	+	+		
<i>Wahlenbergia gracilenta</i>	Annual Bluebell	r						r					+
<i>Wurmbea dioica</i>	Early Nancy		r					r				+	

Scientific name	Common name	P14	P15	P16	P17	P18	P19	P20	P21	P22	P23	P24	P25
<i>Xerochrysum viscosum</i>	Sticky Everlasting	r			r			r			r		5

Appendix E – NCT property purchase letter



14 November 2013

Paul Weedon
Roads and Maritime Services
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ABN 22 526 891 208

Dear Paul,

RE: Securing biodiversity offsets for Kapooka Bridge realignment project.

The Nature Conservation Trust (NCT) confirms that an offer has been made to the vendor, in accordance with RMS instructions, to purchase the land previously discussed which will satisfy the biodiversity offsets required for the above project.

NCT has received verbal confirmation from the vendor's agent today that the offer has been accepted and we expect to receive written confirmation tomorrow afternoon.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Gary Wells".

Gary Wells
CEO
Nature Conservation Trust

GHD

Suite 3, Level 1, 161-169 Baylis Street
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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	M. Cotterill	L. Maloney		R. Robinson		1/11/2013
1	L. Maloney	J. Stokes (Roads and Maritime) and N. Jones (NCT)		R. Robinson		18/11/2013

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