Report

Biodiversity Development Assessment Report

Bangus Infill Development

MH Earthmoving Pty Ltd

6 November, 2019
Rev 1 (Final Report)

advitech.com.au

Report Details

Biodiversity Development Assessment Report - Bangus Infill Development

Job #: J0191145, Folder #: F20798, Revision: 1 (Final Report), Date: 6 November, 2019

Filename: 20798 MH Earthmoving Bangus Infill BDAR Rev1.docx

Prepared For

MH Earthmoving Pty Ltd

c/. Alan Dyer, Director, InSitu Advisory Pty Ltd

Email: alan@insituadvisory.com, Telephone: 02 8998 5261, Mobile: 0409 169661

15/23 Narabang Way Belrose NSW 2085

PO Box 503 Frenchs Forest NSW 1640

Prepared By

Advitech Pty Limited t/a **Advitech Environmental**

ABN: 29 003 433 458

Dr Rod Bennison, Biodiversity Accredited Assessor

Email: rod.bennison @advitech.com.au, Telephone: 02 4924 5400

Facsimile: 02 4967 3772, Web: www.advitech.com.au, General Email: mail@advitech.com.au

7 Riverside Drive Mayfield West NSW 2304 PO Box 207 Mayfield NSW 2304

History

Date	Revision	Comments
5 November, 2019	0	Draft Issue
6 November, 2019	1	Final Issue

Endorsements

Function	Signature	Name and Title	Date
Field Assistance and Preparation of Report		Jed Field Ecologist	6 November, 2019
Preparation and Certification of the Assessment		Dr Rod Bennison Lead Environmental Scientist / Biodiversity Accredited Assessor BAAS19023	6 November, 2019

TABLE OF CONTENTS

FIGURES

APPENDICES

1. INTRODUCTION

Advitech Pty Limited (trading as Advitech Environmental) was engaged by InSitu Advisory Pty Ltd and Salvestro Planning on behalf of MH Earthmoving Pty Ltd. Insitu Advisory and Salvestro Planning are compiling an Environmental Impact Statement for Bangus Quarry Landfill, with the intent to utilise the Bangus gravel quarry as a waste management facility. This Biodiversity Development Assessment Report (BDAR) has been completed in accordance to the Biodiversity Assessment Methodology (BAM). The Bangus Quarry Landfill proposal is considered Designated Development under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). As such, this BDAR supports the Environment Impact Statement (EIS) completed in accordance with the Planning Secretary's Environmental Assessment Requirements (EAR 1321).

In accordance with Section 6.15 of the *Biodiversity Conservation Act 2016* (BC Act), this BDAR, certified by Dr Rod Bennison (the accredited person) has been prepared on the basis of the requirements of (and information provided under) the BAM. This BDAR, including biodiversity credit calculations made using the Biodiversity Assessment Method Calculator was lodged on the NSW Biodiversity Accredited Assessor System (BAAS) on 6 November, 2019.

It should be noted that this report was prepared by Advitech Pty Limited for InSitu Advisory Pty Ltd and Salvestro Planning (on behalf MH Earthmoving Pty Ltd) in accordance with the scope of work and specific requirements agreed between Advitech and the customer. This report was prepared with background information, terms of reference and assumptions agreed with the customer. The report is not intended for use by any other individual or organisation and as such, Advitech will not accept liability for use of the information contained in this report, other than that which was intended at the time of writing.

1.1 Project Background

MH Earthmoving propose to develop and operate a waste management facility off Tumblong Reserve Road, south west of the township of Gundagai. The Bangus Quarry Landfill will utilise the site as a waste management facility by landfilling over an area of 485,000m^3 with an intended capacity of 60,000 tonnes per annum of non-putrescible waste material.

The proposal area is situated at a former quarry that has been used as a source of gravel to service regional needs. The quarry has now reached the end of its productive life and requires remediation in accordance with the quarry licence requirements.

The proposed landfill will service Visy Pulp and Paper, a manufacturing facility located at Tumut, NSW. Contaminants in waste paper such as glass, metal and plastics are required to be sent to landfill in the absence of other resource recovery options. The landfill will be used to store General Solid Waste (Non-Putrescible), composition includes 80% plastics, 8% paper and 12% other materials.

The proposal includes an infill area and temporary stockpile area (**Figure 1.1**) (used for the storage of waste materials). Overall, the proposed clearing will impact 3.45 ha of existing vegetation. The proposed project exceeds the threshold for clearing under the *Biodiversity Conservation Regulation 2017*, above which the BAM and NSW Biodiversity Offsets Scheme apply.

The proposal objectives include:

1. To remediate an existing quarry nearing the end of its economic life in accordance with relevant legislative and community obligations;

2. To establish a waste disposal facility in an environmentally sustainable and responsible manner to meet the needs of local and regional waste recycling activities;
3. To ensure the proposed development meets or exceeds environmental protection goals through the adoption of best practice environmental management, mitigation and remediation technologies;
4. To assist in the delivery of relevant local, regional and State waste minimisation and economic development strategies;
5. To provide employment and economic and community stability to the local area;
6. To operate, maintain, monitor and report on the activities of the development within statutory approval and licensing arrangements; and
7. To undertake rehabilitation works that support and regenerate natural ecosystems and habitats.

1.2 Site Description

The proposed Bangus Quarry Landfill is located along Tumblong Reserve Road, approximately 13 kilometres south west of the township of Gundagai on the New South Wales South Western slopes and plains (a site map is provided in **Figure 1.2**). The proposed waste management facility lies on Lot 7004 DP 1028797 and Lot 7300 DP 1149008. The proposed stockpile area (adjoining the infill site) is located on Lot 10 DP 1210362. Both proposal areas are located in the Cootamundra Gundagai Local Government Area on land zoned RU1 Primary Production.

The infill proposal lots total an area of 4.45 ha. Up to 1.77 ha of vegetation may be impacted at the infill site, described as PCT 268 (*White box – Blakely's Red Gum – Long-leaved box – Nortons Box – Red Stringybark grass-shrub woodland on shallow soils on hill in the NSW South Western Slopes Bioregion*). This vegetation community is significantly disturbed, attributed to the historical clearing and agriculture use of the land. This PCT is associated with the *White Box Yellow Box Blakely's Red Gum Woodland* (listed as Endangered in NSW and Critically Endangered Nationally), but does not meet the threshold of the TEC, according to the Vegetation Integrity (VI) Score (VIS) of vegetation zones.

The stockpile proposal lot is 35.90 ha, which includes a proposed stockpile area of 2.44 ha. During the Stage 2 (impact assessment), the stockpile area has been refined to 1.78 ha, which would impact 1.68 ha of vegetation, described as PCT 343 (*Mugga Ironbark – Red Box – Red Stringybark – Western Grey Box grass/shrub woodland on metamorphic substrates*). This PCT is also significantly disturbed, and characterised by a weedy ground layer, but includes vegetation zones in greater condition. This PCT was not found to meet the description of any Threatened Ecological Communities (TECs).

The proposal sites are adjoined by a travelling stock reserve and large rural holdings. The surrounding area includes primarily open and relatively flat cropping and grazing country. The hill extending north of the proposed stockpile consists of *Eucalyptus sideroxylon* (Mugga Ironbark) community. **Figure 1.3** shows PCTs mapped in the assessment area. Scattered paddock trees in the assessment area provide foraging habitat and support the movement of birds across the landscape. The rural landscape has been subject to historic clearing practices and subject to improved pastures for grazing and cropping purposes.

The following definitions are used throughout this report to refer to locations in the project area:

- The ‘proposal site/area’ is the development footprint comprising all areas that would be directly impacted by the works. This includes areas proposed to vegetation clearing and earthworks;
- The ‘study area’ includes the proposal site and the areas adjacent to the proposal site that may be indirectly impacted by the proposed works; and
- The ‘search area’ refers to a 20 km area surrounding the proposal site for the purpose of database searches.

1.3 Secretary’s Environmental Assessment Requirements

This report will be appended to an Environmental Impact Statement (EIS) which must comply with the requirements of Clauses 6 and 7 of the Environmental Planning and Assessment Regulation 2000, and which addresses environmental considerations identified in the Planning Secretary’s Environmental Assessment Requirements (SEARs) (EAR 1321) relevant to biodiversity.

The SEARs note the following requirements for biodiversity assessment including:

- Accurate predictions of any vegetation clearing on site;
- A detailed assessment of the potential biodiversity impacts of the development, paying particular attention to threatened species, populations and ecological communities and groundwater dependent ecosystems undertaken in accordance with Sections 7.2 and 7.7 of the *Biodiversity Conservation Act 2016*; and
- A detailed description of the proposed measures to maintain or improve the biodiversity values of the site in the medium to long term, as relevant.

1.4 Study Aims

This study aims to assess the potential impacts of the proposed works on the biodiversity values of the local area. Specifically, it aims to:

- Describe the existing environment and assess site biodiversity values;
- Determine whether the proposed development is likely to significant affect threatened species or ecological communities protected under Federal and State legislation;
- Document the application of the avoid, minimise and offset hierarchy including assessing all direct, indirect and prescribed impacts in accordance with the BAM; and
- Determine offset requirements using the BAM calculator.

Figure 1.1: Existing layout and boundaries

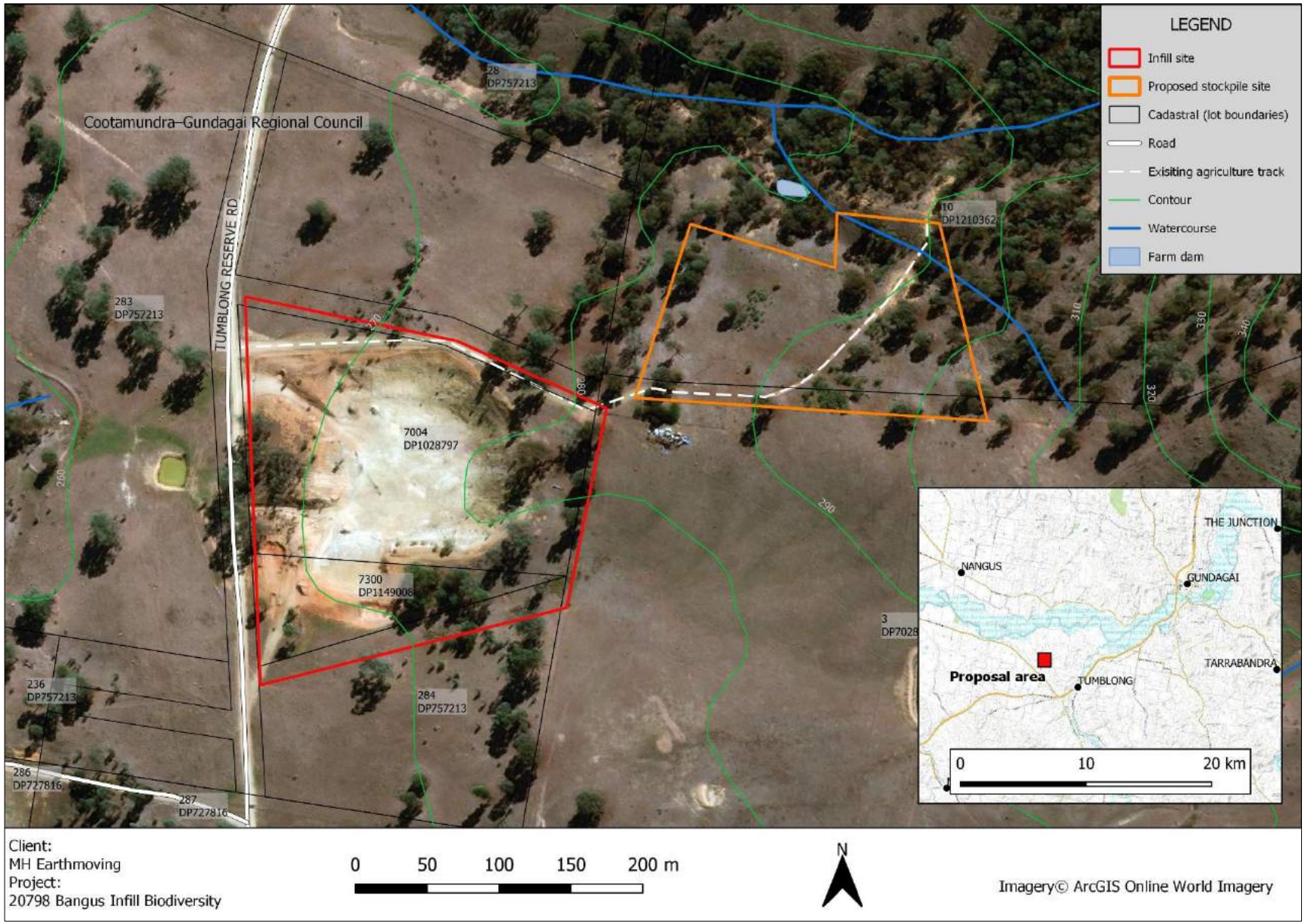


Figure 1.2: Site Map (note, the proposal area is centred in the Inland Slopes IBRA subregion)

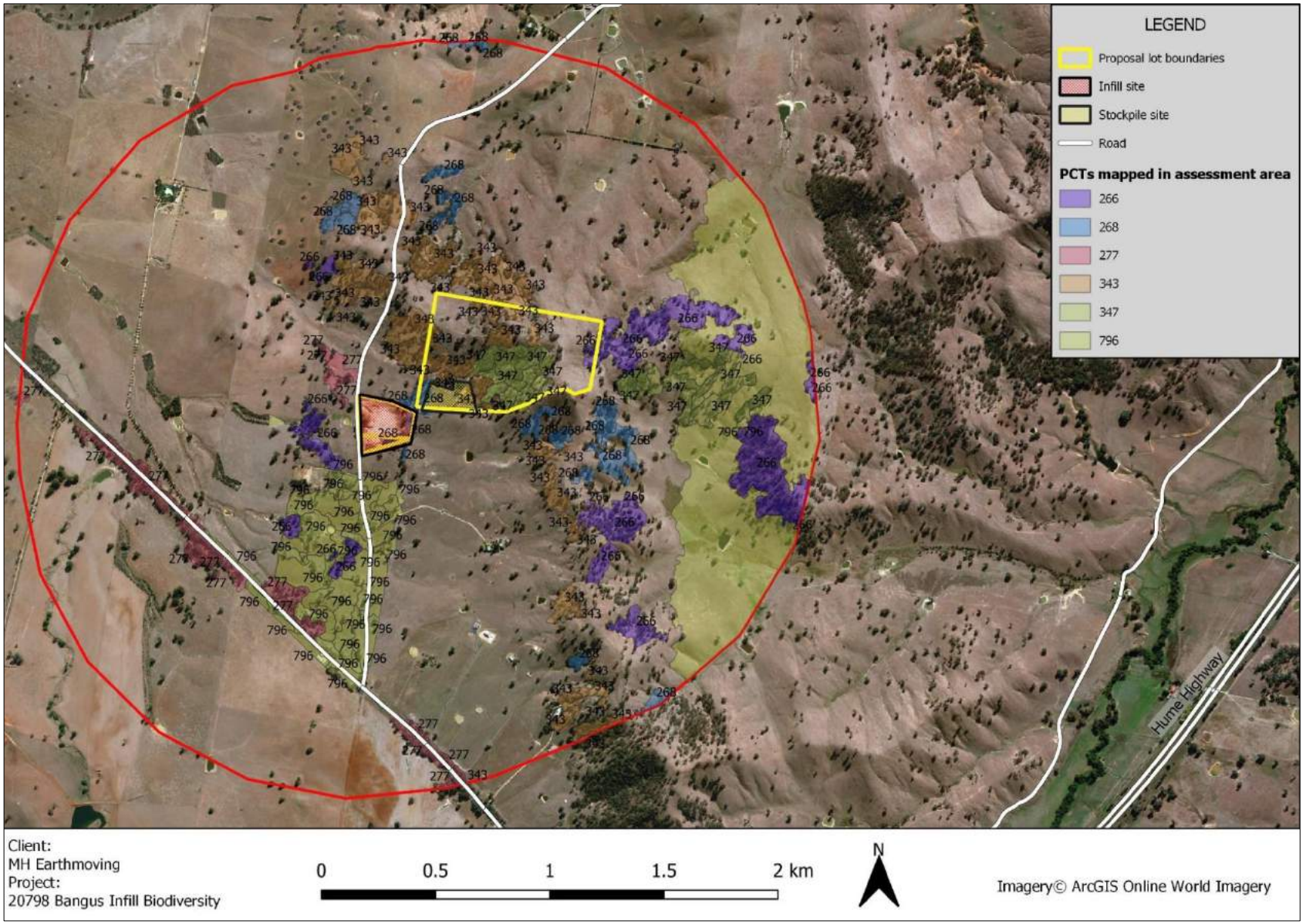


Figure 1.3: Location Map showing habitat connectivity and indicative PCTs (according to the Riverina VIS 4469)

1.5 Legislative Context

1.5.1 Biodiversity Conservation Act 2016

The proposed project exceeds the threshold for clearing listed under Clause 7.23 of the Biodiversity Conservation Regulation 2017 (BC Regulation) (**Table 1.1**). Subsequently, biodiversity impacts related to the proposal are to be assessed in accordance with the Biodiversity Assessment Method (BAM) (OEH, 2017) and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must be prepared by an accredited assessor (BC Act, S.6.10) and include information in the form detailed in the BC Act (S.6.12), BC Regulation (S.6.8) and the BAM. The BAM sets out the requirements for a repeatable and transparent assessment of terrestrial biodiversity values on land in order to:

- identify the biodiversity values on land subject to proposed development;
- determine the impacts of proposed development on biodiversity values; and
- quantify and describe the biodiversity credits required to offset the residual impacts of proposed development on biodiversity values.

Table 1.1: Offset Scheme Thresholds – Vegetation Clearing Area Criteria.

Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme apply
Less than 1 ha	0.25 ha or more
1 ha, and less than 40 ha	0.5 ha or more
40 ha, and less than 1000 ha	1 ha or more
1000 ha or greater	2 ha or more

1.5.2 Environmental Planning and Assessment Act 1979

Development in NSW is subject to the requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and its associated regulations and planning instruments. Developments requiring consent, such as the Bangus Quarry Landfill proposal, are assessed under Part 4 of the EP&A Act. As the proposed waste disposal facility is designated development, the application for development must be accompanied by an environmental impact assessment in the form prescribed by the accompanying regulations, and as stipulated in the SEARs.

1.5.3 Local Planning Instruments

Development at the site is regulated under the Gundagai Local Environmental Plan 2011 that stipulates whether a development is permissible, prohibited, exempt or complying. As the proposed infill is on land zoned RU1 Primary Production, a waste disposal facility is permissible with development consent.

1.5.4 Commonwealth legislation

Under the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), referral is required to the Australian Government for proposed actions that have the potential to significantly impact on Matters of National Environmental Significance (MNES) or the environment of Commonwealth land. The assessment of the impact of the proposal on MNES and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant MNES or on Commonwealth land.

Accordingly, the proposal has not been referred to the Australian Government Department of the Environment and Energy (DoEE) under the EPBC Act.

2. METHODOLOGY

This chapter outlines the methods (desktop and field survey investigations) used to determine the biodiversity values of the proposal site.

2.1 Key Personnel

Key personnel responsible for the assessment are detailed in **Table 2.1**

Table 2.1: Key Personnel.

Name	Role	Experience
Jed Field *BEnvSc&Mgt (Hons.I)*	Field work and author	Ecologist with five years experience in ecological restoration and assisting in vegetation surveys. Associate member of the Ecological Consultants Association of NSW.
John Hembra *BSc*	Field work	Graduate Ecologist with one years experience undertaking bush regeneration and assisting in vegetation surveys.
Dr Rod Bennison *JP BSc MEnvStudies GCPTT PhD FLS*	Certification of the assessment	Lead Environmental Scientist with over 15 years of experience in a consulting environment, with particular expertise in construction management. Practicing member of the Ecological Consultants Association of NSW and accredited assessor (BAAS 19023).

2.2 Database Searches and Literature Reviews

A desktop assessment was undertaken that included searches of databases and a review of literature relevant to the site and local area, particularly:

- NSW Department of Planning, Industry and Environment (DPIE) (formerly Office of Environment and Heritage (OEH):
  - Atlas of NSW Wildlife database (licensed) for records of threatened species and endangered ecological communities which have been recorded within a 20 km radius (locality) of the subject site (September, 2019);
  - Vegetation information system (VIS) database: http://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx;
  - NSW Vegetation Types Database: http://www.environment.nsw.gov.au/projects/BiometricTool.html;
  - State Vegetation Type Map: Riverina Region Version v1.2 – VIS ID 4469; and
  - NSW (Mitchell) Landscapes - version 3.1.
- Australian Government Department of the Environment and Energy (DoEE):
  - Protected Matters Search Tool for Matters of National Environmental Significance (MNES) listed under the EPBC Act within a 20 km radius from the site (September, 2019);
  - Interim Biogeographic Regionalisation for Australia (IBRA) version 7.0;
  - Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (Department of the Environment, Water, Heritage and the Arts, 2013 EPBC Act Policy);

- Species Profiles and Threats Database (SPRAT) http://www.environment.gov.au/cgibin/sprat/public/sprat.pl;

- Australian Bureau of Meteorology (BOM):
  - National Atlas of Groundwater Dependent Ecosystems: http://www.bom.gov.au/water/groundwater/gde/index.shtml; and

2.3 Site Assessment

The site assessment was undertaken from 30 September to 4 October 2019 by Advitech Environmental ecologists, Jed Field and John Hembra. During this period, vegetation plots (according to **Section 2.3.1.1**) were undertaken.

2.3.1 Flora

A number of sampling techniques were used to ensure the site was adequately sampled. The site was scoped using the Random Meander Technique described by Cropper (1993). This involved walking in a random meander throughout the proposal site, visiting the full range of habitats and recording every plant species observed. Vegetation quadrat and transects were established according to **Section 2.2.1.1** and consistent with the Biodiversity Assessment Method Operational Manual – Stage 1. Plant community types (PCTs) were determined by comparing the floristic structure and composition of the vegetation on site with vegetation profiles described within the VIS database and community descriptions of endangered ecological communities known to occur in the local area. A list of all plant species recorded during fieldwork is listed in **Appendix I**. The location of the vegetation surveys is shown in **Figure 2.1**.

2.3.1.1 Vegetation Plots

Six plots were used to assess the composition, structure and function components of vegetation integrity. **Table 2.2** shows that two PCTs were identified on site. Around a central 50 m transect, a 20 x 20 metre quadrat was established to record floristic diversity and combined with a 20 x 50 metre quadrat for recording fauna habitat and forest regeneration. Within the 20 x 50 m plot area, five 1 m^2 plots were also established to assess groundcover composition.

Data collected within each plot/transect includes:

- Flora diversity and composition;
- Vegetation structure (including canopy, sub-canopy, shrub and groundcovers);
- Fauna habitats (including hollow trees, fallen timber);
- Regeneration of canopy species;
- Landscape features (including. slope, gully, and aspect);
- Soil features (including soil type, rocks, organic matter); and
- Geographical coordinates and a photographic record.

Table 2.2: Vegetation plots undertaken (October 2019).

PCT/ Zone	Patch size (ha)	Area (ha) of impact	Minimum plots required	Quadrats completed
268: *White box - Blakely's Red Gum - Long-leaved box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hill in the NSW South Western Slopes Bioregion*				
Zone 1		0.30	1	2 (Q1)
Zone 2		1.47	1	1 (Q2)
TOTAL		1.77		
343: *Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamorphic substrates in the Tarcutta - Gundagai region, NSW South Western Slopes Bioregion*				
Zone 1		1.39	1	2 (Q4,5)
Zone 2		0.29	1	1 (Q6)
Zone 3		0	1	1 (Q3)
TOTAL		1.68		
GRAND TOTAL	> 100	3.45	5	6

2.3.1.2 Fauna

Fauna surveys targeted species that may occur within the habitat available within the proposal area. The sampling methods used to survey fauna habitat within the survey area are detailed below in **Table 2.3**. A list of all fauna species observed during fieldwork is provided in **Appendix I**. The location of targeted fauna surveys is shown in **Figure 2.1**.

Table 2.3: Fauna surveys conducted.

Fauna Group	Surveys	Period Survey Undertaken	Methods
Diurnal birds	Area search	October 2019	A search was undertaken to identify any birds present. Birds were identified from observations or call identification. A search for nests was also undertaken during the survey.
Herpetofauna	Habitat search	October 2019	Opportunistic active searches reptiles were undertaken during the survey within suitable habitat (i.e. leaf litter, under rocks).
Microchiropteran bats	Song Meter recording	October 2019	Echo-location recording (conducted over two separate nights) targeting microchiropteran bats over the nearest waterbody to the proposal area (a farm dam; see **Figure 2.1**).
Owls, nocturnal birds, reptiles and marsupials	Spotlight search	October 2019	One hour after sunset, half an hour was spent searching for eye shine of fauna (conducted over five separate nights) in the proposal area.

Fauna Group	Surveys	Period Survey Undertaken	Methods
Owls, nocturnal birds, reptiles, marsupials and microchiropteran bats	Stag watching	October 2019	From 30 minutes before dusk to 30 minutes after dusk, trees with hollows were watched for any fauna activity.
Diurnal birds, nocturnal birds, reptiles and marsupials	Camera trap	October 2019	Cameras set in areas with dead wood with hollow ends. Cameras were run continuously for five days on camera/video mode
All	Opportunistic sightings	October 2019	Any opportunistic sightings and indications of fauna on site were recorded.

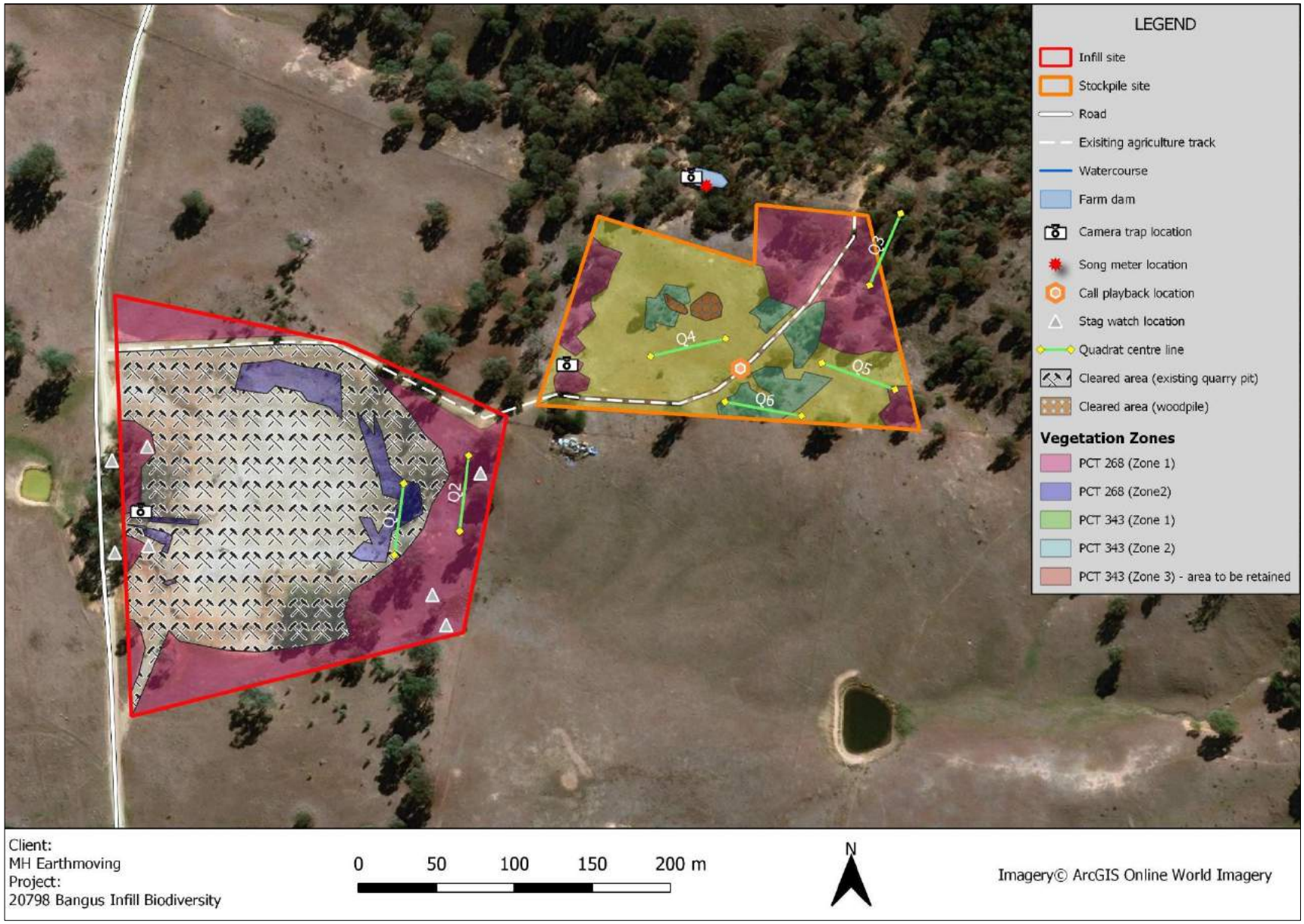


Figure 2.1: Location of quadrats and targeted fauna surveys (October 2019).

2.4 Threatened species data searches

Three data sources were used to compile a list of threatened species that may potentially occur at the proposal site. They include:

1. BAM calculator list of predicted and candidate species;
2. Atlas of NSW Wildlife database (BioNet) records of threatened species within a 20km radius (locality) of the subject site; and
3. Commonwealth Department of the Environment and Energy (DoEE) website – Protected Matters Search Tool (PMST).

The BAM calculator may not import all potential threatened species that may occur at the proposal site. BioNet and PMST sources were used to provide a complete list of potential threatened species recorded in the search area of the proposal site. For each threatened species recorded from Bionet and PMST searches, the habitat suitability of the proposal site was assessed taking into account a number of factors including:

- Structural and floral diversity;
- Occurrence and extent of habitat types in the general vicinity;
- Continuity with similar habitat adjacent to the site, or connection with similar habitat off site by way of corridors;
- Key habitat features such as tree hollows, water bodies, caves and crevices, rocky areas;
- Degree of disturbance and degradation; and
- Topographic features such as aspect and slope.

Each species was assigned with a rating (**Table 2.4**) based on their likelihood to occur within the proposal site. The habitat assessment is provided in **Appendix II**.

Table 2.4: Likelihood of occurrence criteria.

Likelihood Rating	Criteria
Known	The species was recorded within the study area during site surveys.
High	It is likely that a species would inhabit or utilise habitat within the proposal site. Criteria for this category may include: ▪ Species recently and/or regularly recorded in contiguous or nearby habitat. ▪ High quality habitat types or resources present within study area. ▪ Species is known or likely to maintain a resident population surrounding the study area. ▪ Species is known or likely to visit during migration or seasonal availability of resources.
Moderate	Potential habitat for a species occurs within the proposal site. Criteria for this category may include: ▪ Species previously recorded in contiguous habitat albeit not recently (>10 years).

	▪ Poor quality, depauperate or modified habitat types and/or resources present within study area. ▪ Species has potential to utilise habitat during migration or seasonal availability of resources. ▪ Cryptic flora species with potential habitat available within the proposal site that have not been seasonally targeted by surveys.
Low	It is unlikely that the species inhabits the area and would likely be considered a transient visitor if ever encountered. Criteria for this category may include: ▪ The proposal site or study area lacks specific habitat types or resources required by the species. ▪ The proposal site is beyond the current distribution of the species or is isolated from known populations. ▪ Non cryptic flora species that were found to be absent during targeted surveys. ▪ The proposal site only contains common habitat which would not be considered important for the local survival of a threatened species.
Unlikely	The habitat within proposal site and study area is unsuitable for the species.

2.5 Limitations

The effectiveness of a survey detecting a given species will be influenced by a range of factors. For this type of survey, such limitations are generally related to the short period of time in which the fieldwork was carried out during a single season. Given the small period of time spent within the study area, the detection of certain species may be limited by:

- Seasonal migration (particularly migratory birds);
- Seasonal flowering periods (some species are cryptic and are unlikely to be detected outside of the known flowering period);
- Seasonal availability of food such as blossoms;
- Weather conditions during the survey period (some species may go through cycles of activity related to specific weather conditions, for example some microchiropteran bats, reptiles and frogs can be inactive during cold weather); and
- Species lifecycle (cycles of activity related to breeding).

These limitations have been overcome by applying the precautionary principle in all cases where the survey methodology or impeded access to the impact area may have given a false negative result. All species have been assessed on the basis of the presence of their habitat and the likely significance of that habitat to a viable local population.

3. LANDSCAPE CONTEXT

In accordance with Section 4.2 of the BAM, this chapter identifies the landscape features within the proposal site and the assessment area surrounding the proposal site. **Table 3.1** provides an overview of the landscape context of the study area.

Table 3.1: Environmental context summary.

Attribute	Description
LGA	Cootamundra – Gundagai Regional Council
Local Land Service Division	Riverina
Zoning	RU1 (Primary Production)
Catchment	Murrumbidgee catchment
IBRA Bioregion	NSW South Western Slopes
IBRA Subregion	Inland Slopes
Characteristic landforms[1]	Undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans.
Typical Soils[2]	Soil landscape mapping is not available at the proposal sites. The Great Soil Group Map of NSW indicates that Red Earths - less fertile (granites and metasediment) and Red Podzolic Soils - less fertile (granites and metasediment) occur at the proposal areas.
Mitchell Landscape	Adelong Granite Ranges (Adl)
Groundwater Dependent Ecosystems (GDE)	No Aquatic or Terrestrial GDEs are known to occur in the proposal areas
Rivers and streams	No rivers or streams cross the proposal areas
Wetlands	Not applicable
Areas of Geological Significance and Soil Hazards	Not applicable
Areas of Outstanding Biodiversity Value	Not applicable
Nearest NPWS park	Ellerslie (National Parks and Nature Reserves, Zone E1) Nature Reserve, located 15 km south west.

[1] Description from South Western Slopes Bioregion - Inland Slopes subregion (OEH, 2019).

[2] Great Soil Group (GSG) Soil Type map of NSW, NSW Office of Environment and Heritage (2017).

3.1 Connectivity

Tree cover in the proposal areas is fragmented. However, scattered clumps of trees, including paddock trees provide connectivity for highly mobile species such as birds. The stockpile site adjoins a large (> 40 ha), relative intact woodland growing on a steep hill slope. In the local landscape, tree cover extends south to ridgelines north of the Hume Highway and north to the to the Murrumbidgee River. A mix of understorey vegetation provides connectivity for macropods. This proposal is unlikely to result in any impacts on wildlife movement in the local landscape.

3.2 Assessing native vegetation cover

Using the Riverina Region State Vegetation Type Map (Version 1.2, VIS ID 4469), native vegetation cover on the proposal site and within 1500 m of the outside boundary was considered as per the BAM. The total assessment area is 917.44 ha, **Table 3.2** shows that six PCTs were recorded which cover a total area of 114.25 ha. Native vegetation cover was assigned as 12.45% in the BAM calculator.

Table 3.2: Vegetation in the 1500 m assessment area.

PCTs in the assessment area	Sum of area (ha)	% of cover
Native Vegetation		
266	0.70	0.08
268	0.29	0.03
277	0.46	0.05
343	0.46	0.05
347	0.59	0.06
796	111.76	12.18
TOTAL	114.25	12.45
Non PCTs		
Not Native	803.19	87.55
GRAND TOTAL	917.44	100

3.3 Assessing patch size

The area of intact native vegetation that occurs on the development site and adjoining land that is not part of the development site was estimated. In assessing patch size, as per the BAM, patches of woody vegetation were assessed as separate patches when > 100 m from the next area of moderate to good condition native vegetation and patches of grassland were assessed as separate patches when > 30 m from the next area of moderate to good condition native vegetation. A large, continuous patch of vegetation was identified with a patch size > 100 ha (see **Figure 2.1**).

4. NATIVE VEGETATION

This chapter identifies and describes the most likely PCTs within the proposal site and assesses vegetation integrity based on methods detailed in **Section 2.3.1**.

4.1 Plant community types

Two PCTs were identified within the proposal area, a description is provided in **Table 4.1** and **4.2**. A full list of species recorded during the field survey is provided in **Appendix I**.

Table 4.1: Description of PCT 268.

PCTID	268: *White box - Blakely's Red Gum - Long-leaved box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hill in the NSW South Western Slopes Bioregion*
Estimate of % cleared	63% (based on the VIS classification database)
Area (ha)	1.77
BC Act Status	*White Box Yellow Box Blakely's Red Gum Woodland* - Endangered
EPBC Act Status	*White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands* - Critically Endangered
Vegetation Formation	Grassy Woodlands
Vegetation Class	Western Slopes Grassy Woodlands
Identifying features and occurrence on site	This PCT occurs along the boundary of the infill area. The community is significantly disturbed, groundcover is dominated by exotic grasses and forbs including *Erodium botrys, Arctotheca calendula* and *Lolium rigidum*. There are no shrubs present. Around the boundary of the infill area, mature and regenerating canopy trees include *Eucalyptus blakelyi* and *E. albens*. Two condition classes of this PCT were identified (described below).
Canopy (to 20m)	*Eucalyptus blakelyi* (Blakely's Red Gum) and *E. albens* (White box).
Shrubs (0.5 0-2m)	Absent
Goundcover (0-0.5m)	*Austrodanthonia spp.* (A Wallaby Grass), *Oxalis perennans, Aristida vagans* (Threeawn Speargrass) and *Austrostipa spp.* (A Speargrass).
Weeds	*Arctotheca calendula* (Capeweed), *Vulpia myuros* (Rat's Tail Fescue), *Erodium botrys* (Long Storksbill), *Aira cupaniana* (Silvery Hairygrass) and *Poa bulbosa* (Bulbous Poa).
Condition	This community occurs on a lower slope in an undulating landscape. Two condition classes of vegetation were described including: ▪ Zone 1: This condition class is restricted to the disturbed slopes around the existing pit. It is characterised by regenerating *Eucalyptus blakelyi* and *E. albens* (stems are generally < 5 cm DBH), see **Photo 1**. Soil is bare; however, some native tussock grasses are present including *Aristida vagans* and weeds such as *Aira cupaniana*.

- Zone 2: This condition class occurs around the boundary of the infill area and consists of a primarily exotic groundlayer with scattered mature and regenerating *E. blakelyi* and *E. albens* trees, see **Photo 2**.

Photo 1: PCT 268, Zone 1 showing regenerating *Eucalyptus blakelyi* in a disturbed area.

Photo 2: PCT 268, Zone 2 showing the ground layer dominated by weed species

Table 4.2: Description of PCT 343.

PCTID	343: *Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamorphic substrates in the Tarcutta - Gundagai region, NSW South Western Slopes Bioregion*
Estimate of % cleared	88% (based on the VIS classification database)
Area (ha)	1.68
BC Act Status	N/A
EPBC Act Status	N/A
Vegetation Formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation Class	Western Slopes Dry Sclerophyll Forests
Identifying features and occurrence on site	This PCT occurs at the proposed stockpile site. The majority of the community in the proposal area is significantly disturbed, groundcover is dominated by exotic forbs and grasses. This PCT is ecotonal with PCT 268 (recorded at the infill site) at the south west extent of the stockpile site. However, PCT 343 best fitted the description given presence and dominance of *Eucalyptus sideroxylon* (Mugga Ironbark) in the canopy. Canopy trees including *E. sideroxylon* and *E. blakelyi* occur scattered (primarily around the boundaries of the proposal area). Occasional clumps of *Acacia decora* occur throughout the proposal area, the shrub layer also includes *Lissanthe strigose*. Native groundcover included forbs, rush's and grasses including *Geranium solanderi, Lomandra spp.* and *Aristida behriana.* Three condition classes of this PCT are described below.
Canopy (to 20m)	*Eucalyptus sideroxylon* (Mugga Ironbark), *E. blakelyi* (occasional) and *Acacia pycnantha* (Golden Wattle).
Shrubs (0.5 0-2m)	*Acacia decora* (Western Silver Wattle) and *Lissanthe strigosa* (Peach Heath).
Goundcover (0-0.5m)	*Lomandra patens* (Irongrass), Austrostipa spp. (A Speargrass), *Aristida behriana* (Bunch Wiregrass), *Oxalis perennans, Cheilanthes sieberi, Juncus spp.* and *Arthropodium minus* (Small Vanilla Lily).
Weeds	*Echium plantagineum* (Patterson's Curse), *Lolium spp.* (A Ryegrass), *Bromus diandrus* (Great Brome), *Anthoxanthum odoratum* (Sweet Vernal Grass) and *Erodium botrys* (Long Storksbill).
Condition	This community occurs on an undulating slope. Three condition classes of vegetation were described including: ▪ Zone 1: This condition class occurs throughout the majority of the stockpile area. It is characterised by weedy groundcover and occasional trees including *Eucalyptus sideroxylon* and *E. blakelyi.* Trees are regenerating, generally < 50 cm DBH, see **Photo 3**. ▪ Zone 2: This condition class is characterised by pockets of areas with dense cover of *Acacia decora*. The groundcover is dominated by weeds such as *Arctotheca calendula* and *Erodium botrys*. Native rush's and forbs occur in relative low density and include *Lomandra spp.* and *Rumex brownii, see* **Photo 4.** ▪ Zone 3: This condition class occurs on the fridge of the stockpile area where vegetation begins to transition into a relative intact woodland, see

Photo 5. Native plant composition was relatively low against benchmark (11 native species were recorded (n=1)), however the community included relative high cover of *E. sideroxylon* and presence of large trees (> 50 cm DBH). This vegetation zone will not be impacted by the proposal.

Photo 3: PCT 343, Zone 1 showing the ground layer dominated by weed species with occasional clumps of *Lissanthe strigosa*

Photo 4: PCT 343, Zone 2 showing dense cover of *Acacia decora*.

Photo 5: PCT 343, Zone 3 showing an understorey of *Lissanthe strigosa* under *Eucalyptus sideroxylon*

4.2 PCT Selection

Using a spreadsheet of PCTs available through Bionet, PCTs were selected based on a filtration process.

4.2.1 PCT 268

PCT 268 (*White box - Blakely's Red Gum - Long-leaved box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hill in the NSW South Western Slopes Bioregion*) was identified as the closest fit to vegetation found at the infill site.

PCTs were filtered based on IBRA bioregion (South Western Slopes), IBRA subregion (Inland Slopes), County (Gundagai), Vegetation Formation (Grassy Woodlands), Vegetation Class (Western Slopes Grassy Woodlands) and upper canopy species (*Eucalyptus albens* and *E. blakelyi*). This returned a short list of five PCTs. Assigning a PCT was difficult due to the lack of native understorey plants. Isolated canopy trees at the proposal site included *E. albens* and *E. blakelyi*, both occur dominant in PCT 268. Ground stratum species recorded in the PCT species list included *Rumex brownii, Oxalis perennans, Cheilanthes sieberi* and *Carex inversa*.

The State Type Vegetation Map (Riverina Version 1.2) indicated that PCT 268 may occur in the infill area and western boundary of the stockpile site. This PCT is associated with the *White Box Yellow Box Blakely's Red Gum Woodland* (listed in NSW as Endangered under the BC Act and Critically Endangered Federally under the EPBC Act).

4.2.2 PCT 343

PCT 343 (*Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamophic substrates in the Tarcutta - Gundagai region, NSW South Western Slopes Bioregion*) was identified as the closest fit to vegetation found at the stockpile site.

PCTs were filtered based on IBRA bioregion (South Western Slopes), IBRA subregion (Inland Slopes), County (Gundagai), Vegetation Formation (Grassy Woodlands, Dry Sclerophyll Forests (Shrub/grass sub-formation and Dry Sclerophyll Forests (Shrubby sub-formation), Vegetation Class (Western Slopes Grassy Woodlands and Western Slopes Dry Sclerophyll Forests) and upper canopy species (*Eucalyptus sideroxylon*). This returned a short list of four PCTs. PCT 343 was selected because it was the only PCT where *E. sideroxylon* dominates the canopy and *E. blakelyi* occurs occasionally. Ground stratum species recorded in the PCT species list included *Geranium solanderi, Wahlenbergia stricta* and *Lomandra spp.*

The State Type Vegetation Map (Riverina Version 1.2) indicated that PCT 343 may occur in the north west corner of the stockpile area. This PCT is not associated with any TEC, and the community lacks key diagnostic canopy species associated with the aforementioned *White Box Yellow Box Blakely's Red Gum Woodland*. Therefore, it is considered that vegetation recorded in the stockpile area is not likely to be associated with any TEC.

4.3 Threatened Ecological Communities

The *White Box Yellow Box Blakely's Red Gum Woodland* is consistent with the BC Act description of the TEC. In the project area, PCT 268 (associated with the TEC) was found fringing the proposed infill area and characterised by the presence of White Box (*Eucalyptus albens*) and Blakely's Red Gum (*E. blakelyi*). According to ID guidelines for this community (also listed in **Table 4.3)**, degraded remnants that have few, if any, native species in the understorey (typical where agricultural practices have been more intensive) are considered to form part of the community.

The proposal retains the majority of mature *E. albens* and *E. blakelyi* trees found fringing the boundary of the proposal site (only four mature trees will be cleared). The current VI scores for zone 1 and 2 of PCT 268 are <15. The BAM does not generate ecosystem credits for endangered or critically endangered ecological communities with a VI score <15. Given the development impacts highly disturbed areas with limited native groundcover, it is proposed no ecosystem credits are required to offset the residual impact of development on this PCT. According to **Figure 4.1,** the community is not likely to meet the EPBC description of the community, considering a predominately native ground layer is not present.

Table 4.3: Key characteristics of White Box Yellow Box Blakely's Red Gum Woodland EEC

Diagnostic feature	Comments
Is the site on the tablelands or western slopes of NSW?	Yes
Does the site contain, or would the site have recently been likely to contain, White Box, Yellow Box or Blakely's Red Gum?	Yes, White Box and Blakely's Red Gum
Is the ground layer mainly grassy?	No - weedy
If the site has been degraded, is there potential for assisted natural regeneration of the tree layer or the understorey (e.g. by removing grazing, weeds, etc)?	Yes, some Eucalypt saplings were observed around the fringes of the infill area

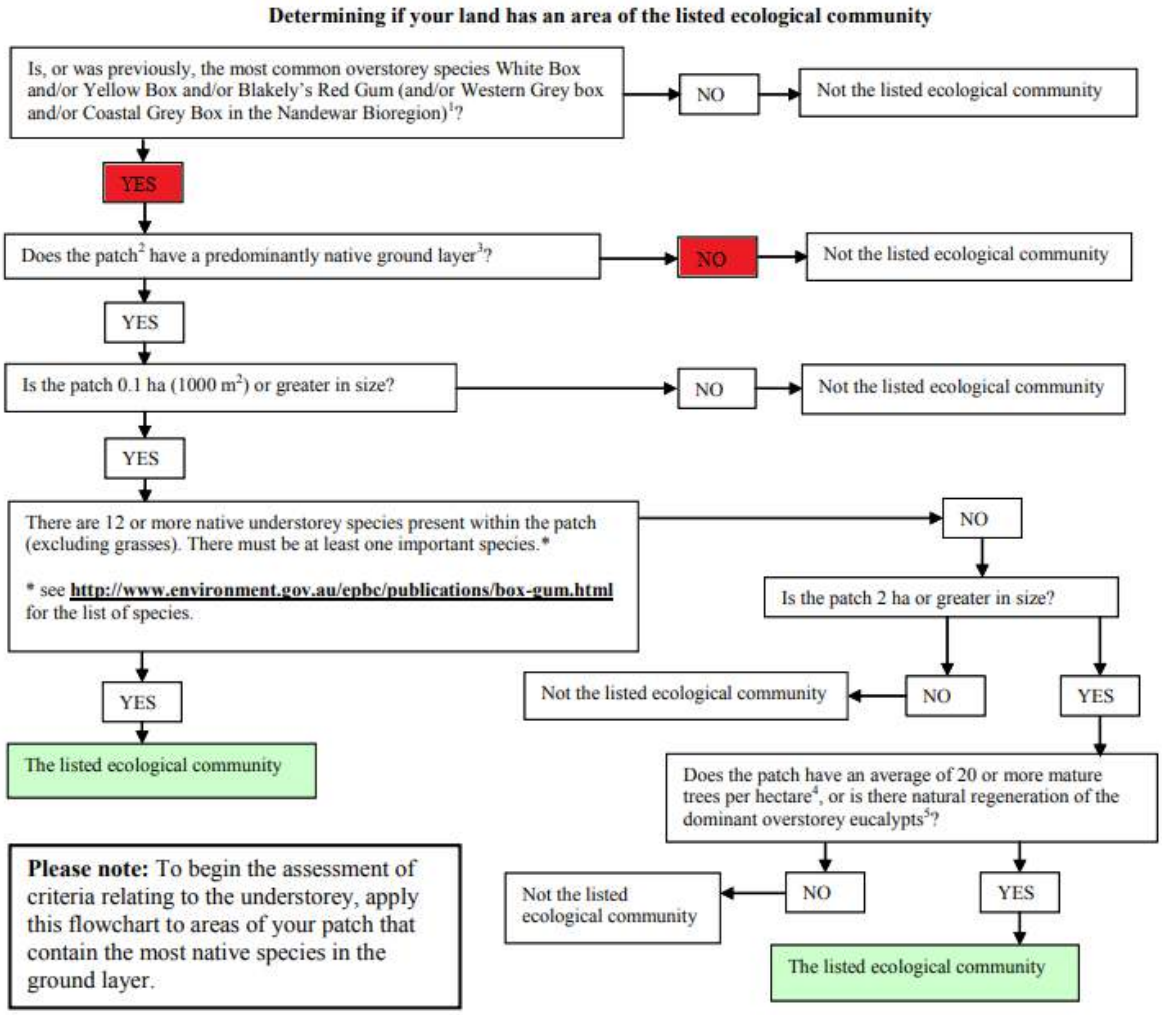


Figure 4:1: EPBC Act guidelines for White Box Yellow Box Blakely's Red Gum Woodland EEC identification

4.4 Vegetation Integrity

Six vegetation condition plots were undertaken within the proposal site and the summary of plot data is provided in **Table 4.4**. Plots were randomly positioned within the proposal area using random coordinates generated using geographical information system (GIS) software. Plots were randomly selected in each vegetation zone using a random bearing. Random bearings were modified if vehicle trails/other recent anthropogenic disturbance to vegetation occurred inside plot boundaries or the bearing would result in the plot extending outside the vegetation zone.

Table 4.4: Vegetation integrity scores

Plot	PCT	Condition Class	Composition						Structure						Function[1]					VIS /100
			Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other	Large trees	HBTs	LC	LFL	HTE	
2	268	Zone1	0	0	2	2	0	0	0	0	6	2.1	0	0	0	0	18.4	16	0	8.5
1	268	Zone2	2	0	2	0	0	1	9	0	0.7	0	0	0.1	0	0	12.8	0	0	8.4
4	343	Zone1	0	1	4	5	1	0	0	1	3.8	0.7	0.1	0	0	0	2.6	0	7	15
5	343	Zone1	1	2	4	4	0	0	0.1	2.1	8.8	0.6	0	0	0	0	4.6	2	0.5	
6	343	Zone2	0	1	3	2	0	0	0	60	6.2	0.6	0	0	0	0	36.8	3.5	5	18.5
3	343	Zone3	1	3	3	4	1	0	25	11	10.3	0.4	0.1	0	6	0	27	9	0.1	50.7[2]

[1] HBT: Number of hollow bearing trees, LC: Leaf cover, LFL: Length of fallen logs, HTE: High Threat Exotic cover.

[2] PCT 343 (zone 3) will not be impacted by the proposal

4.5 Fauna habitat

Fauna habitat resources are present throughout the proposal area, including within the construction footprint. Key habitat features recorded within the proposal site include:

- Trees and shrubs may provide foraging and nesting habitat for a range of birds and reptiles;
- Hollow bearing trees provide nesting and shelter habitat for birds and microchiropteran bats;
- Fallen timber including hollow logs provide habitat for fauna including invertebrate species dependent on decaying wood;
- Ground cover including leaf litter, grassy tufts, and dead wood may provide habitat and cover for a range of small terrestrial species; and
- Rocks including loose boulders provide shelter for shelter for small terrestrial species.

Observations of fauna species recorded during the field survey are contained in **Appendix I**.

4.5.1 Hollow bearing trees

Figure 4.2 shows that a total of seven trees were recorded with hollows. Out of seven trees, it is proposed that four will be retained by the development and three will be cleared. **Table 4.5** shows that a total of 15 hollows were recorded across the seven trees, of which nine would be cleared and six would be retained.

Table 4.5: Hollow-bearing trees recorded at the proposal site

Tree No. (Figure 4.2.)	To be cleared?	Easting	Northing	Site	Species	DBH	S[1]	M[2]	L[3]
1	Y	589220	6113475	Infill	*Eucalyptus blakelyi*	190	2	1	
2	Y	589198	6113381	Infill	Stag	155	2	3	
3	Y	589192	6113374	Infill	*E. albens*	160	1		
4	N	589192	6113374	Infill	*E. albens*	180	2		
5	N	589192	6113374	Infill	*E. albens*	140	1		
6	N	589192	6113374	Infill	*E. albens*	120	2		
7	N	589192	6113374	Infill	*E. albens*	173	1		
Number of hollows recorded inside the proposal areas							**11**	**4**	**0**
Total number of hollows proposed to be cleared							**5**	**4**	**0**

[1] Small sized hollow openings (i.e. 2-5cm) suitable for species such as microchiropteran bats.

[2] Medium sized hollow openings (i.e. 5-10cm) suitable for species such as gliders and possums.

[3] Large sized hollow openings (i.e. >10cm) suitable for large birds and owls.

[4] Paddock tree (not in the proposal area).

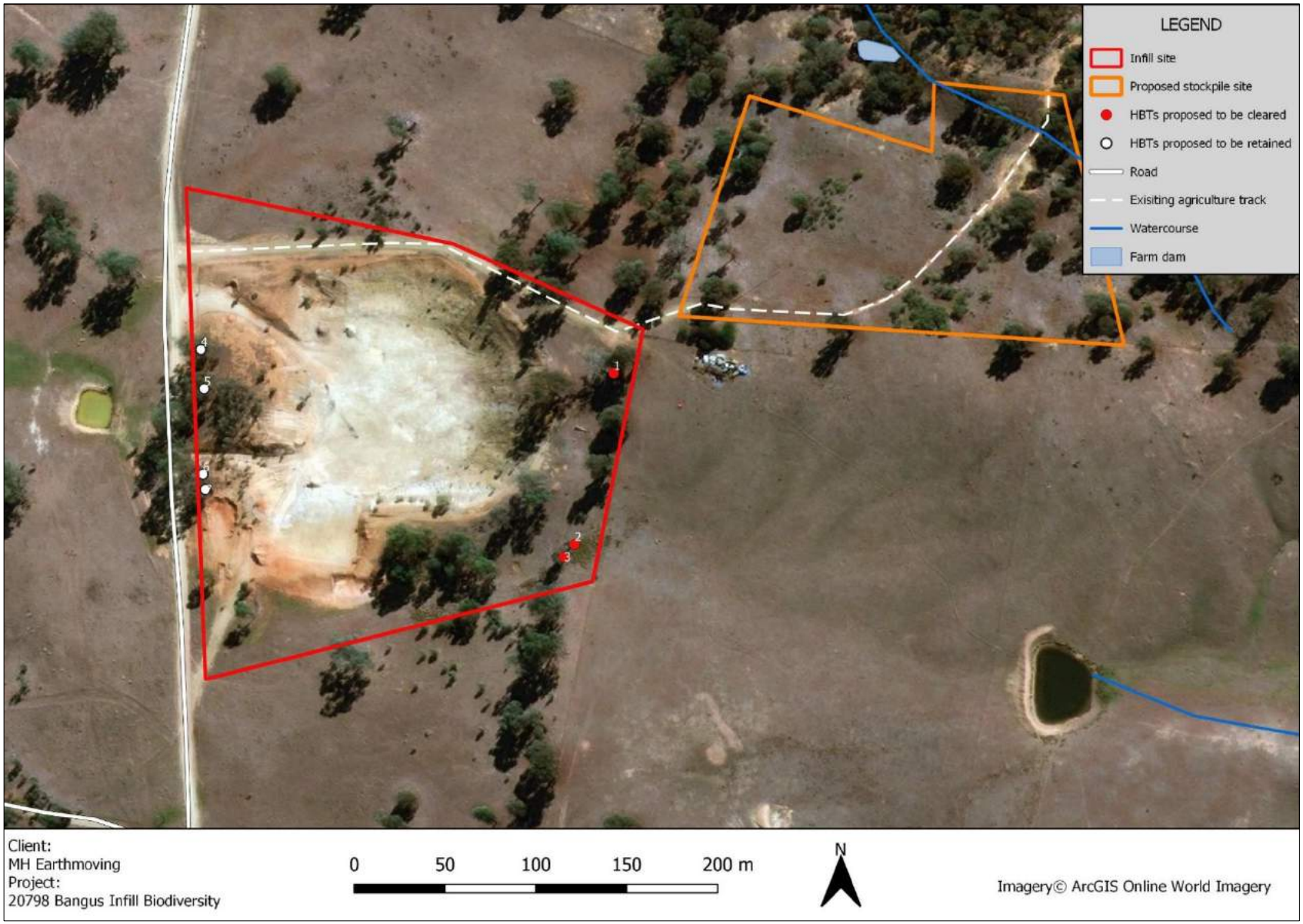


Figure 4.2: Hollow bearing trees recorded in the proposal areas

4.6 Weeds

One state priority weed was recorded within the stockpile area. The control categories for this species is detailed below in **Table 4.6**. Priority weeds should be managed in accordance with the Riverina Regional Strategic Weed Management Plan 2017-2022 (Local Land Services, 2017) and safeguards detailed in **Section 6** to minimise their impact and ensure compliance with the *Biosecurity Act 2015*.

Table 4.6: Priority weeds recorded in proposal area for the Riverina LLS region

Species	State priority	Mandatory Measure[1]	WoNS?[2]	HTE?[3]	Occurrence
Bromus diandrus (Great Brome)	-	-	N	Y	Recorded in low density throughout the stockpile area

[1] Mandatory Measure (Division 8, Clause 33, Biosecurity Regulation 2017).

[2] Weed of National Significance.

[3] High Threat Exotic (HTE) cover is assigned in the function attribute of the BAM calculator. A list of HTE is available from: https://www.lmbc.nsw.gov.au/bamcalc.

Weeds on site require appropriate controls in order to comply with the *Biosecurity Act 2015*. The contractor must ensure that all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

5. THREATENED SPECIES

This chapter assesses habitat suitability for threatened species including ecosystem credit species associated with habitat and species credit species associated with the site context. The results of targeted surveys for candidate threatened species are also provided.

5.1 Threatened Species for Assessment

Using six criteria (listed below), the BAM Credit Calculator identified that 22 candidate species (species credit species) and 26 predicted species (ecosystem credit species) required consideration for assessment. This preliminary list is generated where all six criteria were met. The calculator maintains assessment species where information for a species was not available for a certain criterion.

The BAM Credit Calculator determined candidate species for assessment based on the following six criteria (BAM, 2017):

1. The distribution of the species includes the IBRA subregion which the subject land is mostly located in the Inland Slopes IBRA subregion;
2. The study area is within any geographic constraints of the distribution of the species within the IBRA subregion;
3. The species is associated with any of the PCTs identified within the study area;
4. The native vegetation cover within an assessment area including a 1500m buffer around the study area is equal to or greater than the minimum required for the species;
5. The patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species; and
6. The species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

5.1.1 Species Credit Species

Species credit species cannot be confidently predicted by vegetation surrogates and landscape features; however, can be reliably detected by survey (BAM, 2017). These species are assessed according to habitat suitability and are recorded as either present or absent. Species may be recorded as present if detected during field assessment or assumed as present (including by expert report). Where a species is assumed present during a BDAR (not by expert report), the species polygon must encompass the entire vegetation zone/s within which the candidate species is predicted to use/occur.

Species credit species were assessed as absent from the proposal site if:

- There were habitat/geographical constraints (including those generated from the BAM calculator);
- The species was not recorded during site assessment visits (during the specified survey period); or
- If according to BAM Section 6.4.1.17, habitat was assessed as substantially degraded, such that the species is unlikely to utilise the proposal site (or specific vegetation zones).

Table 5.1 outlines the assessment of limitations to determine whether or not species were maintained as candidate species. Out of the 22 candidate species, 15 were surveyed and found to be absent, five species were assessed as absent (habitat degraded or geographic limitations) and two species were assumed present.

Table 5.1: Validation of species credit (candidate) species

Scientific name/ Common name	Habitat constraints	Geographic limitations	Habitat degraded?	BAM period surveyed	Confirmed candidate species?	Species habitat, ecology and justification of candidate species status
FAUNA						
Anthochaera phrygia Regent Honeyeater (Breeding)			No	October 2019	Yes (assumed present)	The Regent Honeyeater inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. The bird is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar, including Mugga Ironbark *E. sideroxylon*, and White Box *E. albens* - found at the proposal site. Given the proposal area contains suitable habitat for this species, including important nectar producing trees and tree hollows, this species has been assumed present.
Burhinus grallarius Bush Stone-curlew	Fallen/standing dead timber including logs		No	October 2019	No (surveyed)	The Bush Stone-curlew inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. The bird is largely nocturnal and known to be active on moonlit nights. This species was not recorded during field assessments. Targeted searches including diurnal and nocturnal bird surveys and camera traps focussed in areas with dead wood/ adjacent a farm dam.
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	Eucalypt tree species with hollows greater than 9 cm diameter		Yes	October 2019	No (habitat degraded)	The Gang-gang Cockatoo favours old growth forest and woodland for nesting and roosting. Nests are located in hollows that are > 9cm in diameter and at least 9 m above the ground in eucalypts. No suitable hollows were recorded in the proposal area. Due to habitat constraints, this species has been assessed as absent from the proposal area.

Scientific name/ Common name	Habitat constraints	Geographic limitations	Habitat degraded?	BAM period surveyed	Confirmed candidate species?	Species habitat, ecology and justification of candidate species status
Calyptorhynchus lathami Glossy Black-Cockatoo (Breeding)	Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground.		Yes	N/A	No (habitat degraded)	The Glossy Black-Cockatoo inhabits open forest and woodlands and feeds on the seeds of Casuarina and Allocasuarina species. No Allocasuarina or Casuarina trees or shrubs were recorded in the proposal areas. Furthermore, the site lacks any large tree hollows that could support nesting or breeding. Due to habitat constraints, this species has been assessed as absent from the proposal area.
Cercartetus nanus Eastern Pygmy-possum			No	October 2019	No (surveyed)	The Eastern Pygmy-possum is found in a broad range of habitats (including Box-Ironbark) forest. The species feeds on nectar and pollen and insects throughout the year. The possum has been recorded nesting in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum dreys and thickets of vegetation. Targeted searches for this species, including trapping, stag watching, and spotlighting failed to detect this species. This species has been assessed as absent from the proposal area.
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	Live large old trees	Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	No	October 2019	No (geographic limitations, habitat constraints)	The White-bellied Sea-Eagle is highly selective in nesting locations. Breeding habitat is live large old trees within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines and the presence of a large stick nest within tree canopy; or an adult with nest material; or adults observed duetting within breeding period. This species was assessed as absent due to geographic limitations. The nearest potential habitat for this species is available along the Murrumbidgee River, 2.3 km north of the proposal area.

Scientific name/ Common name	Habitat constraints	Geographic limitations	Habitat degraded?	BAM period surveyed	Confirmed candidate species?	Species habitat, ecology and justification of candidate species status
Hieraaetus morphnoides Little Eagle (Breeding)	Nest trees - live (occasionally dead) large old trees within vegetation.		No	October 2019	No (surveyed)	The Little Eagle requires nest trees - live (occasionally dead) large old trees within vegetation. Paddock trees are known to provide important breeding habitat. Breeding habitat includes the presence of a male and female; or female with nesting material; or an individual on a large stick nest in the top half of the tree canopy. This species was not detected during targeted searches, furthermore no active or large unused stick nests indicative of historical breeding were identified in the proposal area. This species has been assessed as absent.
Lathamus discolor Swift Parrot (Breeding)			No	October 2019	Yes (assumed present)	The Swift Parrot migrates to the Australian south-east mainland between February and October. Favoured feed trees found at the proposal site include Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Given the proposal area contains suitable habitat for this species, including important nectar producing trees and tree hollows, this species has been assumed present.
Litoria booroolongensis Booroolong Frog			Yes	N/A	No (habitat degraded)	The Booroolong Frog is found along permanent western-flowing streams of the Great Dividing Range. Adults occur on or near cobble banks and other rock structures within stream margins. The proposal site does not contain any habitat that could support this species. This species has been assessed as absent from the proposal area.
Lophoictinia isura Square-tailed Kite (Breeding)			No	October 2019	No (surveyed)	The species is allocated to dual credit because they tend to be sensitive to disturbance around nests. No large stick nests indicative of historical breeding was recorded within the proposal area. This species was not detected during targeted searches, furthermore no active or large unused stick nests indicative of historical breeding were identified in the proposal area. This species has been assessed as absent.

Scientific name/ Common name	Habitat constraints	Geographic limitations	Habitat degraded?	BAM period surveyed	Confirmed candidate species?	Species habitat, ecology and justification of candidate species status
Ninox connivens Barking Owl (Breeding)	Living or dead trees with hollows greater than 20cm diameter			October 2019	No (habitat degraded)	The Barking Owl occurs in a wide but sparse distribution in NSW. It inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. The Barking Owl requires large tree hollows for nesting. No suitable hollows were identified in the proposal areas. Furthermore, this species was not recorded during call playback surveys, stag watching or spotlighting surveys. Due to habitat constraints, this species has been assessed as absent from the proposal area.
Petaurus norfolcensis Squirrel Glider				October 2019	No (surveyed)	West of the Great Dividing Range, the Squirrel Glider inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest. The species relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely-connected (i.e. no more than 50 m apart). Hollow bearing trees identified at the proposal site were isolated (> 50 m) from habitat patches. Targeted searches for this species, including trapping, stag watching, and spotlighting failed to detect this species. This species has been assessed as absent from the proposal area.
Phascogale tapoatafa Brush-tailed Phascogale	Hollow bearing trees			October 2019	No (surveyed)	The Brush-tailed Phascogale is mainly found east of the Great Dividing Range although there are occasional records west of the divide. The species inhabits dry sclerophyll open forest with sparse groundcover of herbs, grasses and shrubs. Targeted searches for this species, including trapping, stag watching, and spotlighting failed to detect this species. This species has been assessed as absent from the proposal area.

Scientific name/ Common name	Habitat constraints	Geographic limitations	Habitat degraded?	BAM period surveyed	Confirmed candidate species?	Species habitat, ecology and justification of candidate species status
Phascolarctos cinereus Koala (Breeding)				October 2019	No (surveyed)	Vegetation in the proposal area is isolated from large habitat patches with known Koala populations. Woody native vegetation cover in the assessment area is low (12.45%) which may limit movement of individuals to the proposal site. Koalas have not been previously recorded in the assessment area (within 20 km of the proposal site). No evidence of Koala occupation was observed at the proposal site. This species was not recorded during field assessments and has been assessed as absent.
Polytelis swainsonii Superb Parrot (Breeding)	Hollow bearing trees			October 2019	No (surveyed)	The Superb Parrot inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. They nest in small colonies, often with more than one nest in a single tree. Nesting has been recorded in a range of living or dead Eucalyptus with hollows > 5cm and 4m above the ground. This species was not recorded during targeted searches, it has been assessed as absent.
FLORA						
Ammobium craspedioides Yass Daisy		South of Cowra		October 2019	No (surveyed)	The Yass Daisy is a is a rosette-forming perennial. It is found in moist or dry forest communities, Box-Gum Woodland and secondary grassland derived from clearing of these communities. This species has been recorded once in the assessment area, 10 km from the proposal site in 1867. This species was not recorded during targeted searches.

Scientific name/ Common name	Habitat constraints	Geographic limitations	Habitat degraded?	BAM period surveyed	Confirmed candidate species?	Species habitat, ecology and justification of candidate species status
Bossiaea fragrans				October 2019	No (surveyed)	*Bossiaea fragrans* is an erect shrub in the Fabaceae family that grows to 1-2.5m high. The species is currently only known from the Abercrombie Karst Conservation Reserve, south of Bathurst on the NSW central tablelands. It is highly restricted, with only a small number of known populations. This species has not been recorded in the assessment area or during targeted searches.
Caladenia concolor Crimson Spider Orchid		West of Jingellic		September, October 2019	No (surveyed)	The Crimson Spider Orchid is characterised by five long spreading petals and sepals around a broad down-curled labellum. The flower stem is up to 30 cm tall and it has a single leaf up to 15 cm long. Habitat is regrowth woodland on granite ridge country that has retained a high diversity of plant species, including other orchids. Dominant trees the species is associated with includes *Eucalyptus blakelyi* and *E. albens* - found in the proposal area. Habitat at the proposal site is degraded and unlikely to support this species. This species has not been recorded in the assessment area or during targeted searches.
Pultenaea humilis Dwarf Bush-pea				October 2019	No (surveyed)	*Pultenaea humilis* is an erect to prostrate shrub, 0.2-0.8 m high with branchlets erect or drooping that are sparsely to moderately hairy. The species is found in isolated remnants of native woodland and forest communities that occur in extensively cleared agricultural landscapes. In NSW, the species is known from three locations in the NSW South Western Slopes Bioregion. This species has not been recorded in the assessment area or during targeted searches.
Senecio garlandii Woolly Ragwort				October 2019	No (surveyed)	Woolly Ragwort is a many-branched perennial herb or shrub growing to 1.2 m tall. It occurs on sheltered slopes of rocky outcrops. Habitat in the proposal area is unlikely to support Woolly Ragwort. This species has not been recorded in the assessment area or during targeted searches.

Scientific name/ Common name	Habitat constraints	Geographic limitations	Habitat degraded?	BAM period surveyed	Confirmed candidate species?	Species habitat, ecology and justification of candidate species status
Swainsona recta Small Purple-pea				October 2019	No (surveyed)	Small Purple-pea is a slender, erect perennial herb growing to 30 cm tall. It grows in association with understorey dominants that include *Themeda australis*, *Poa spp*. and *Austrostipa spp*. Habitat in the proposal area is unlikely to support the Small Purple-pea. This species has not been recorded in the assessment area or during targeted searches.
Zieria obcordata				October 2019	No (surveyed)	*Zieria obcordata* is a dense, rounded, perennial shrub to 0.5 m high. It occurs at two sites with a geographic range of 105 km (Wuuluman area near Wellington and Crackerjack Rock/Rock Forests area NW of Bathurst). Grows in eucalypt woodland or shrubland dominated by species of Acacia on rocky hillsides. Habitat in the proposal area is unlikely to support *Zieria obcordata*. This species has not been recorded in the assessment area or during targeted searches.

5.1.2 Ecosystem Credit Species

Targeted surveys are not required for ecosystem credit species because the likelihood of occurrence of a species or elements of the species habitat can be predicted by vegetation surrogates and landscape features (BAM, 2017). The BAM calculator determines biodiversity credits for these species using the vegetation integrity score for each vegetation zone. **Table 5.2** lists ecosystem credit species predicted to occur on site. Potential foraging habitat is available for all predicted species; hence, they were maintained as ecosystem credits in the calculator.

Table 5.2: Ecosystem candidate species

Scientific Name	Common Name
Anthochaera phrygia (Foraging)	Regent Honeyeater
Artamus cyanopterus cyanopterus	Dusky Woodswallow
Callocephalon fimbriatum (Foraging)	Gang-gang Cockatoo
Calyptorhynchus lathami (Foraging)	Glossy Black-Cockatoo
Chthonicola sagittata	Speckled Warbler
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)
Daphoenositta chrysoptera	Varied Sittella
Dasyurus maculatus	Spotted-tailed Quoll
Falsistrellus tasmaniensis	Eastern False Pipistrelle
Glossopsitta pusilla	Little Lorikeet
Grantiella picta	Painted Honeyeater
Haliaeetus leucogaster (Foraging)	White-bellied Sea-Eagle
Hieraaetus morphnoides (Foraging)	Little Eagle
Lathamus discolor (Foraging)	Swift Parrot
Leipoa ocellata	Malleefowl
Lophoictinia isura (Foraging)	Square-tailed Kite
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)
Neophema pulchella	Turquoise Parrot
Ninox connivens (Foraging)	Barking Owl
Petroica boodang	Scarlet Robin
Petroica phoenicea	Flame Robin
Phascolarctos cinereus (Foraging)	Koala
Polytelis swainsonii (Foraging)	Superb Parrot
Stagonopleura guttata	Diamond Firetail
Varanus rosenbergi	Rosenberg's Goanna

5.2 Threatened Species Search Area Results

Table 5.3 shows that database searches identified 58 threatened species with the potential to occur within the search area (20 km radius around the proposal area) including 10 out of the 22 candidate (species credit) species imported by the BAM calculator.

An additional 47 threatened species were identified in the search area results but not on the BAM candidate species list. A habitat assessment determining the likelihood of these species to be impacted by the proposed works is provided in **Appendix II.** Given habitat and geographic constraints, none of these additional threatened species were considered likely to occur at the proposal site. Species identified with a moderate potential at occurring in the proposal area were either candidate species already considered in this assessment or classified as ecosystem species.

Table 5.3: Threatened species that may occur in the local area (candidate species are highlighted)

Scientific name	Common name	BC ACT[1]	EPBC Act[1]	No. of recorded locations[2]	Total no. of records	Potential occurrence	Distance (km)[3]	Database source[4]
Flora								
Ammobium craspedioides	Yass Daisy	V	V	1	1	Low	9.77	Bionet, PMST
Amphibromus fluitans	River Swamp Wallaby-grass	V	V	0	0	Low	-	PMST
Caladenia arenaria	Sand-hill Spider Orchid	E	E	3	3	Low	10.40	Bionet, PMST
Caladenia concolor	Crimson Spider-orchid	E	V	0	0	Low	-	PMST
Grevillea wilkinsonii	Tumut Grevillea	E	E	0	0	Low	-	PMST
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	0	0	Low	-	PMST
Prasophyllum petilum	Tarengo Leek Orchid	E	E	0	0	Low	-	PMST
Swainsona recta	Small Purple-pea	E	E	0	0	Low	-	PMST
Swainsona sericea	Silky Swainson-pea	V		1	1	Low	13.45	Bionet
Thesium australe	Austral Toadflax	V	V	0				PMST
Amphibia								
Crinia sloanei	Sloane's Froglet	V	E	0	0	Low	-	PMST
Litoria booroolongensis	Booroolong Frog	E	E	1	1	Low	15.91	Bionet, PMST
Litoria raniformis	Growling Grass Frog	E	V	0	0	Low	-	PMST
Aves								
Anthochaera phrygia	Regent Honeyeater	CE	CE	0	0	Low	-	PMST
Ardea ibis	Cattle Egret		C,J	1	1	Low	9.65	Bionet

Artamus cyanopterus cyanopterus	Dusky Woodswallow	V		49	156	Moderate	1.53	Bionet
Botaurus poiciloptilus	Australasian Bittern	E	E	0	0	Low	-	PMST
Calidris ferruginea	Curlew Sandpiper	E	CE	0	0	Low	-	PMST
Callocephalon fimbriatum	Gang-gang Cockatoo	V		4	32	Moderate	15.42	Bionet
Chthonicola sagittata	Speckled Warbler	V		5	9	Low	19.09	Bionet
Circus assimilis	Spotted Harrier	V		1	1	Low	6.85	Bionet
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V		219	481	Moderate	1.12	Bionet
Daphoenositta chrysoptera	Varied Sittella	V		7	25	Moderate	5.84	Bionet
Falco subniger	Black Falcon	V		4	4	Low	8.25	Bionet
Glossopsitta pusilla	Little Lorikeet	V		3	7	Low	15.33	Bionet
Grantiella picta	Painted Honeyeater	V	V	0	0	Low	-	PMST
Hieraaetus morphnoides	Little Eagle	V		3	3	Low	11.05	Bionet
Hirundapus caudacutus	White-throated Needletail		C,J,	2	62	Moderate	8.24	Bionet, PMST
Lathamus discolor	Swift Parrot	E	CE	9	167	High	15.21	Bionet, PMST
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V		9	12	Moderate	11.09	Bionet
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V		68	152	Moderate	12.60	Bionet
Merops ornatus	Rainbow Bee-eater		J	53	185	Moderate	1.44	Bionet
Neophema pulchella	Turquoise Parrot	V		20	35	Moderate	10.75	Bionet
Ninox connivens	Barking Owl	V		1	1	Low	8.89	Bionet

Numenius madagascariensis	Eastern Curlew		CE	0	0	Low	-	PMST
Oxyura australis	Blue-billed Duck	V		1	4	Low	1.12	Bionet
Petroica boodang	Scarlet Robin	V		15	23	Moderate	15.33	Bionet
Petroica phoenicea	Flame Robin	V		20	21	Moderate	1.12	Bionet
Polytelis swainsonii	Superb Parrot	V	V	40	196	Moderate	1.12	Bionet, PMST
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V		1	1	Moderate	7.63	Bionet
Rostratula australis	Australian Painted-snipe	E	E	0	0	Low	-	PMST
Stagonopleura guttata	Diamond Firetail	V		74	129	Moderate	1.12	Bionet
Fish								
Galaxias rostratus	Flathead Galaxias		CE	0	0	Low	-	PMST
Maccullochella macquariensis	Trout Cod	E	E	0	0	Low	-	PMST
Maccullochella peelii	Murray Cod		V	0	0	Low	-	PMST
Macquaria australasica	Macquarie Perch	E	E	0	0	Low	-	PMST
Insecta								
Synemon plana	Golden Sun Moth	E	CE	0	0	Low	-	PMST
Mammalia								
Dasyurus maculatus	Spotted-tailed Quoll	V	E	1	1	Low	17.84	Bionet, PMST
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		6	9	Low	10.23	Bionet
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	0	0	Low	-	PMST

Petauroides volans	Greater Glider		V	0	0	Low	-	PMST
Petaurus australis	Yellow-bellied Glider	V		1	1	Low	15.33	Bionet
Petaurus norfolcensis	Squirrel Glider	V		1	1	Low	15.33	Bionet
Phascolarctos cinereus	Koala	V	V	0	0	Low	-	PMST
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	4	5	Low	9.65	Bionet, PMST
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		1	1	Low	11.05	Bionet
Reptilia								
Aprasia parapulchella	Pink-tailed Worm-lizard	V	V	0	0	Low	-	PMST
Delma impar	Striped Legless Lizard	V	V	0	0	Low	-	PMST

[1] Status Abbreviations: V – Vulnerable, E – Endangered, CE – Critically Endangered, C,J -JAMBA, CAMBA (migratory species), X – extinct.

[2] Number of OEH wildlife atlas records in selected area Approx. 20km radius [North: -34.96 West: 147.81 East: 148.21 South: -35.27].

[3] Distance recorded in metres from the centre of the proposal area (calculated using GIS).

[4] Database sources: PMST (EPBC Protected Matters Search Tool, see **Appendix III** for summary of results), Bionet records within 20 km of the proposal area.

5.3 Results of Targeted Field surveys for Threatened/ Candidate Species

To determine the impacts of development on candidate species identified at the proposal site, the BAM Calculator assesses the habitat condition within mapped species polygons and biodiversity risk weighting for species contained in the Threatened Biodiversity Collection. Based on the species sensitivity to loss, the BAM Credit Calculator generates credit calculations.

5.3.1 Survey Effort

A summary of the time spent during fieldwork and the prevailing weather conditions is summarised below in **Table 5.4**. Weather data is recorded from Gundagai (Nangus Rd) (station 073141), located 13 km east of the proposal site.

Table 5.4: Survey dates, times, activities and weather conditions

Date	Time	Activity	Weather Conditions		
			Min – Max °C	Wind Spd (km/h)	Rain mm
30.09.19	16.00-20.00	▪ General site inspection ▪ Setting up arboreal traps, camera traps ▪ Stag watching ▪ Call playback ▪ Spotlighting	2.0-21.5	S 4	0
1.10.19	06.00-20.00	▪ Vegetation survey ▪ Targeted candidate species searches ▪ Opportunistic searches and sightings ▪ Stag watching ▪ Call playback ▪ Spotlighting	5.5-23.0	NE 4	0
2.10.19	06.00-20.00	▪ Vegetation survey ▪ Targeted candidate species searches ▪ Opportunistic searches and sightings ▪ Stag watching ▪ Call playback ▪ Spotlighting	5.5-27.5	NNE 9	0
3.10.19	06.00-11.00, 17.00-20.00	▪ Vegetation survey ▪ Targeted candidate species searches ▪ Opportunistic searches and sightings ▪ Stag watching ▪ Call playback ▪ Spotlighting	8.5-30.5	NW 9	0

5.3.2 Flora

No threatened/candidate flora species were recorded at the proposal site during a survey undertaken in September-October 2019. All candidate flora species could be assessed during the timing of the assessment. Despite dry conditions in the region, the site did not appear to be drought affected at the time of survey with a range of small forbs in flower and farms dams relatively full. A total of 40.5 mm of rain was recorded from Gundagai in the four weeks leading up to fieldwork. Targeted searches included thorough coverage of the proposal areas which included a total of 50 person hours over four days. All locations of the proposal area were visited including searching under *Acacia decora* shrubs.

Survey guidelines (listed in spreadsheet V.1.1 available from the BAM calculator website) was only available for 2/7 candidate flora species (*Caladenia concolor* and *Zieria obcordata*). No specific survey guidance was provided for *C. concolor*. A habitat assessment determined that this species was unlikely to be present in the proposal areas given the site is substantially degraded due to the agriculture use of the land (vegetation zones to be impacted are dominated by weedy groundcover). Habitat for *C. concolor* includes granite ridge country that has retained a high diversity of plant species, including other orchids. The proposal areas contained low diversity of native species, in addition, no other orchid species were identified in the proposal areas.

Survey guidance for *Z. obcordata* included using flowers to locate. The species is recorded as flowering in October. The targeted search was undertaken during October but failed to locate any individuals. A list of all plant species recorded during fieldwork is listed in **Appendix I**.

5.3.3 Fauna

No candidate species were recorded in the proposal areas during surveys undertaken in September-October 2019. Two species of nomadic pollinators, *Anthochaera phrygia* (Regent Honeyeater) and *Lathamus discolor* (Swift Parrot) were assumed present. These species were assumed present in vegetation zones (listed in **Table 5.5**) that included Eucalypt trees. This follows the best guidance and the precautionary principle, considering the proposal area contains known important feed trees for this species (*E. albens* and *E. sideroxylon*) that provide nectar and pollen and potential breeding habitat (hollows 5-10 cm in diameter). In addition, *L. discolour* is known to inhabit the local area, and has been recorded 167 times within 20 km of the proposal lots.

Table 5.5: Area of candidate flora species assumed as present

Species	Area	PCT/ vegetation zone	Number of credits
Anthochaera phrygia (Regent Honeyeater)	3.45	PCT 268 (zone 2)	9
Lathamus discolor (Swift Parrot)	3.45	PCT 268 (zone 2)	9

A list of all fauna species recorded during fieldwork is listed in **Appendix I**. **Table 5.6** shows the result of targeted searches and **Table 5.7** specifies the fauna survey techniques undertaken and survey effort for candidate species. **Figure 2.1** shows the location of targeted fauna surveys. The survey methods and effort are consistent with the Draft Threatened Biodiversity Survey and Assessment Guidelines (DEC, 2004) or any recommended survey guidelines listed on the Threatened Biodiversity Profile Data Collection.

Table 5.6: Results of targeted searches for nocturnal birds, owls and gliders

Night (sampling session)	Elliot traps	Stag watching	Call play back	Spotlighting
30.09.19	N/A	-	-	Brush-tail Possum recorded outside of the proposal area, at the stockpile site
1.10.19	-	-	-	Brush-tail Possum recorded outside of the proposal area, at the stockpile site (same individual as previous night)
2.10.19	-	-	-	Brush-tail Possum recorded outside of the proposal area, at the stockpile site (same individual as previous nights)
3.10.19	-	-	-	-
4.10.19	-		-	-

Table 5.7: Fauna survey techniques and survey effort for candidate species

Candidate species	Survey technique	No. of sites	Survey effort per site	Survey period	Total survey effort
Small hollow nesting mammals ▪ *Cercartetus nanus* (Eastern Pygmy-possum) ▪ *Petaurus norfolcensis* (Squirrel Glider) ▪ *Phascogale tapoatafa* (Brush-tailed Phascogale)	Trapping (Sherman A Type Trap (Medium), PVC pipe trap).	11 (7 Sherman traps, 4 pipe traps)	Four nights, traps set with peanut butter-oat mix and honey spray	September -October 2019	44 trap nights over four consecutive nights
	Stag watching	7	Four nights, from 30 minutes before dusk to 60 minutes after dusk	September -October 2019	12 person-hours
	Spotlight search (from vehicle and on foot)	Throughout proposal area and following trail up the hill at the stockpile site	At least 0.5 hours of spotlighting	September -October 2019	4 nights, 4-person hours
Hollow nesting birds ▪ *Anthochaera phrygia* (Regent Honeyeater) ▪ *Callocephalon fimbriatum* (Gang-gang Cockatoo) ▪ *Calyptorhynchus lathami* (Glossy Black-Cockatoo) ▪ *Lathamus discolor* (Swift Parrot) ▪ *Polytelis swainsonii* (Superb Parrot)	Diurnal bird survey	Throughout proposal area	Identification of birds sighted/ heard calling, observation of all tree hollows in the proposal area	September -October 2019	5 days, 62-person hours

Candidate species	Survey technique	No. of sites	Survey effort per site	Survey period	Total survey effort
Raptors ▪ *Lophoictinia isura* (Square-tailed Kite) ▪ *Hieraaetus morphnoides* (Little Eagle) ▪ *Haliaeetus leucogaste* (White-bellied Sea-Eagle)	Diurnal bird survey including searching for stick nests	Throughout proposal area	Observation of all tree crowns in the proposal area	September -October 2019	5 days, 62-person hours
Large forest owls ▪ *Ninox connivens* (Barking Owl)	Call Playback	1	Five-minute playback and listening for the, Barking Owl, undertaken twice.	September -October 2019	4 nights, 3-person hours
	Spotlight search (from vehicle and on foot)	Throughout proposal area	At least 0.5 hours of spotlighting	September -October 2019	4 nights, 4-person hours
Burhinus grallarius (Bush Stone-curlew)	Diurnal/ nocturnal bird survey	Throughout proposal area	Identification of birds sighted/ heard calling	September -October 2019	5 days, 66-person hours
	Camera trap	3 (**Figure 2.1**.)	Four days/nights active in the field targeting areas with dead wood, animal trails	September -October 2019	288 hours

5.3.3.1 Camera traps

Three motion detector cameras (model: Nextech QS8043) were left running on photo/video modes over four nights between 30 September and 3 October, 2019. Cameras were set in areas with dead wood or areas with defined animal trails, see **Figure 2.1.** In total, six species were recorded by the camera, including four species of native bird (Australian Magpie, Sulphur-crested Cockatoo, Laughing Kookaburra and Pied Currawong) and two species of mammal (Eastern grey Kangaroo and Swamp Wallaby). No cryptic or threatened species were recorded by the cameras.

5.3.3.2 Microchiropteran Bats

Using echo-location over four separate nights, at least seven species of microchiropteran bats were recorded adjacent the proposal area at a farm dam (using the Song Meter SM4). **Table 5.8** shows that one threatened species, *Miniopterus orianae oceanensis* (listed as Vulnerable in NSW) was recorded.

Table 5.8: Microchiropteran Bats recorded at the proposal site using echo-location

Scientific name	Common Name	Roosting habitat[1]	Biodiversity credit species?	No. of nights recorded (/4)	Comments
Austronomus australis	White-striped free-tailed bat	Tree hollows	-	4	
Chalinolobus morio	Chocolate wattled bat	Tree hollows	-	4	
Chalinolobus gouldii	Gould's Wattled Bat	Tree hollows	-	4	
Nyctophilus sp.		Tree hollows	-	4	Due to the difficulty of differentiating calls within the genus *Nyctophilus*, it was not possible to identify these calls to species level. It should be noted that individual calls on nights 1, 2 and 3 displayed some characteristics associated with *N. geoffroyi*; however, the relatively low number of calls displaying these characteristics limits their diagnostic value.
Saccolaimus flaviventris (possible)	Inland Broad-nosed Bat	Tree hollows	-	2	*S. flaviventris* is 'possible' because the identification was based on a single short sequence on each of nights 1 and 3. The possibility that the few pulses in each call may represent a more common species such as C. gouldi using a lower harmonic cannot be conclusively ruled out.
Miniopterus orianae oceanensis	Large Bent-winged Bat	Caves	Species/ Ecosystem	4	Any impacts on breeding habitat could be considered potentially serious and irreversible. Potential breeding for this species is caves, tunnels, mines or other structures known or suspected to be used by *M. schreibersii oceanensis*. No breeding habitat is located within the proposal site or within 500 m.
Vespadelus regulus	Little Forest Bat	Tree hollows	-	4	

[1] From Churchill (2008).

6. IMPACT ASSESTMENT

This chapter focuses on Stage 2 of the BAM (Impact Assessment). Stage 2 applies the avoid, minimise and offset hierarchy and assesses direct, indirect and prescribed biodiversity impacts associated with proposed activities.

6.1 Avoid and Minimise Potential Impacts

6.1.1 Locating the project

The proposal is situated at a former quarry. The infill area proposal lots are significantly disturbed. Native vegetation is primarily limited to regenerating and mature trees located < 10 m from the lot boundary. The majority of these trees, located along the boundary will be retained, including 3/7 hollow bearing trees or stags.

The stockpile site is also located in a significantly degraded location. The majority of the stockpile site lacks native trees and shrubs and is dominated by herbaceous weeds. The confines of the stockpile area have been revised to minimise impact to vegetation zones with greater integrity The proposal originally sought to clear the whole stockpile area, but will retain PCT 343, zone 3 (see **Figure 6.2**), which was recorded with a VI Score of 50.7.

This stockpile site is located adjacent to the infill area. Overall, the small, confined proposal footprint will not isolate any habitat or impact habitat connectivity for wildlife. The proposal also avoids impacting high condition vegetation, located up slope of the stockpile site which includes an intact canopy layer and primarily native understorey.

6.1.2 Designing the project

The project has been designed and refined to avoid unnecessary impact to vegetation. This includes retention of trees within the boundary of the infill area (currently dominated by herbaceous weeds). This area will be rehabilitated with restoration soils following formation of the infill area (see **Figure 6.2**). This includes planting/sowing of native grasses found at the proposal site and/or formative of PCT 268. This restoration action will improve the current condition of the vegetation zone.

The stockpile site is a temporary facility required for the proposal. It will be returned to the former land (grazing area), following its closure. Only areas necessary for viability of the proposal will be impacted.

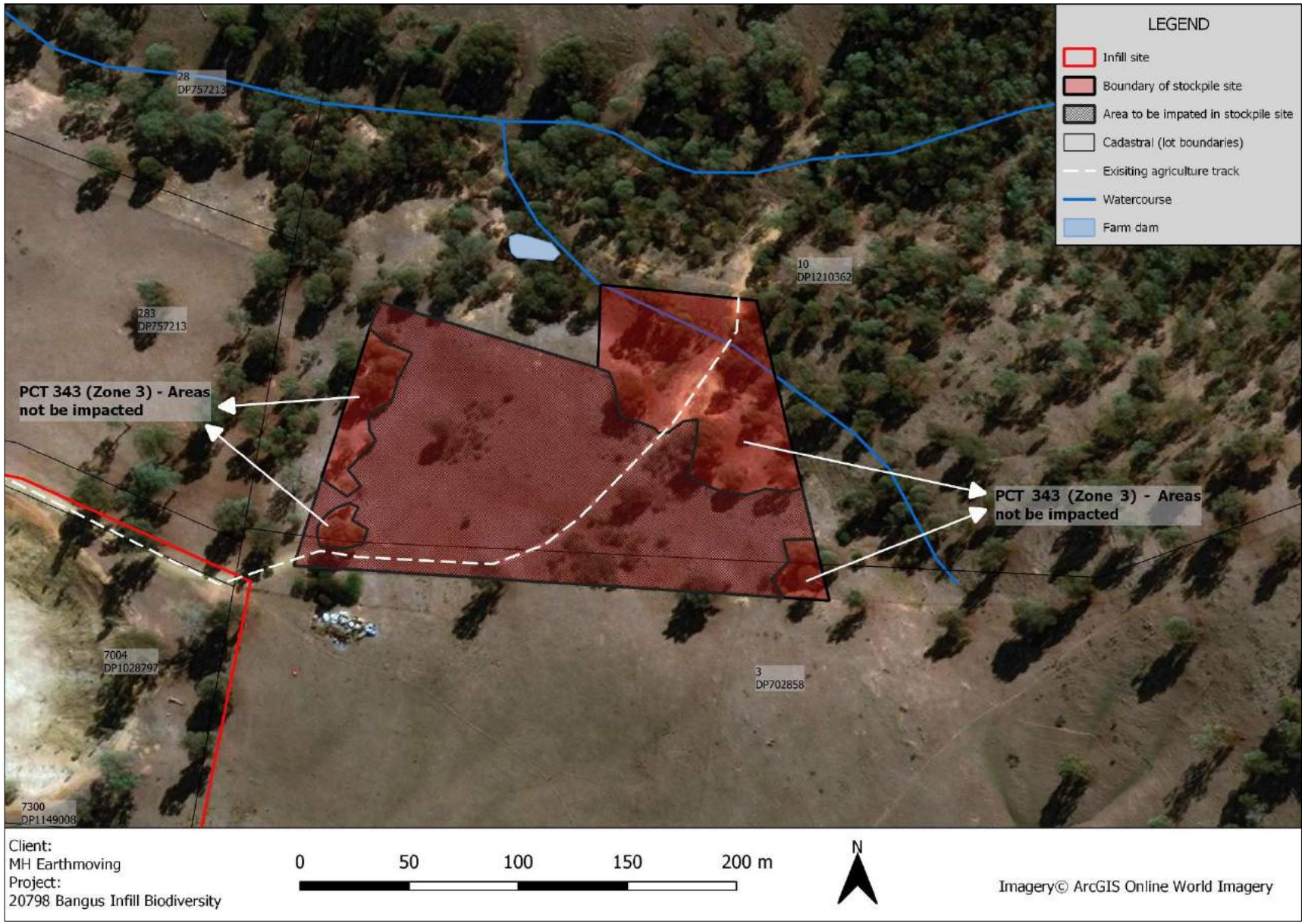


Figure 6.1: PCT 343, Zone 3 will be retained in the stockpile site

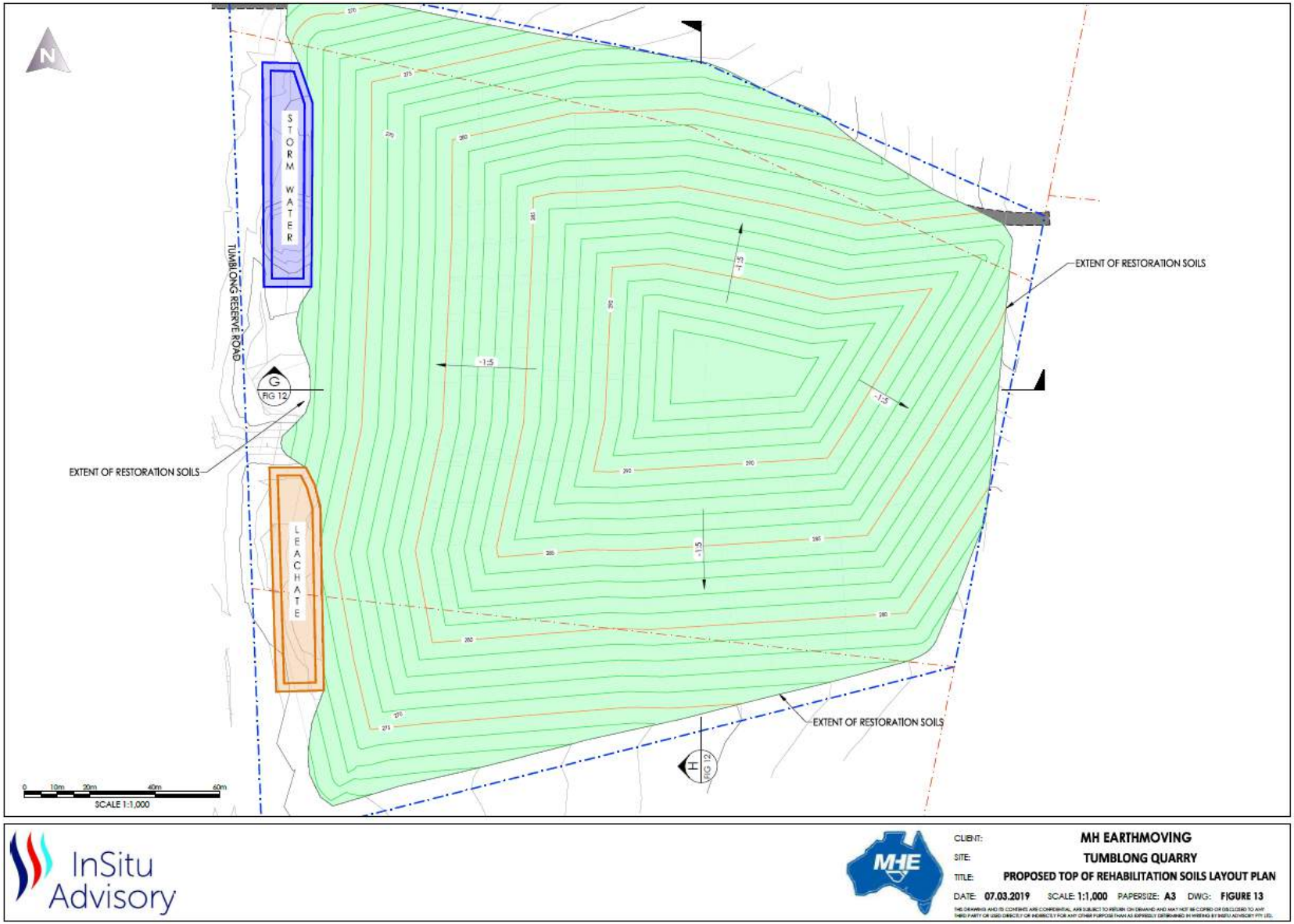


Figure 6.2: Proposed area for rehabilitation at the infill site

6.2 Prescribed Impacts

The BC Regulation (Division 6.1) identifies actions that are prescribed as impacts to be assessed under the biodiversity offsets scheme. **Table 6.2** shows that the project has the potential to result in prescribed biodiversity impacts. No threatened entities are likely to be affected by prescribed impacts.

6.3 Direct Impacts: Loss of Vegetation and Habitat

The potential loss of vegetation and habitat associated with the proposal is summarised in **Table 6.1**.

Table 6.1: Vegetation to be impacted by the proposed works

Plant Community Type and Vegetation Zone	Listing		Potential Direct Impact (ha)
	BC Act	EPBC Act	
268: *White Box - Blakely's Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion*	**E**	**CE**	
Zone 1	E	-	0.30
Zone 2	E	-	1.47
Total			1.77
343: *Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamorphic substrates in the Tarcutta - Gundagai region, NSW South Western Slopes Bioregion*	**N/A**	**N/A**	
Zone 1			1.39
Zone 2			0.29
Zone 3			0
Total			1.68
GRAND TOTAL			3.45

6.4 Indirect Impacts

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities and threatened species habitat beyond the subject land. Impacts may also result from changes to landuse patterns, such as an increase in vehicular access and human activity on native vegetation, threatened ecological communities and threatened species habitat. **Table 6.3** describes and assesses the impacts of the proposal on native vegetation and habitat beyond the subject site as detailed in Section 9.1.4.2 of the BAM. No threatened entities are likely to be affected by indirect impacts.

The removal of vegetation for the proposed works will add to the incremental fragmentation of vegetation within the local area. The proposal will not isolate any habitat or prevent the movement of foraging macropods to reach larger habitat patches located beyond the proposal site.

The proposal would involve clearing and earthworks in areas subject to significant weed infestation. During construction, there is potential to disperse weed seeds and plant material into adjoining remnant vegetation. Increased weed growth has the potential to result in decreased native species diversity and can further degrade local native flora and fauna habitats.

Table 6.2. Prescribed biodiversity impacts

Prescribed impact	Nature of impact	Impacted entities	Extent	Duration	Consequence
Impacts of development on the following habitat of threatened species or ecological communities: ▪ *Karst, caves, crevices, cliffs and other geological features of significance; or* ▪ *Rocks; or* ▪ *Human made structures; or* ▪ *Non-native vegetation.*	N/A	N/A	N/A	N/A	N/A
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	The removal of vegetation for the proposed works will fragment vegetation within the local area.	Macropods	PCT 268, 343	Potential long term	The proposal will result in the clearing of 3.45 ha. The proposal retains connectivity of native grassland at the proposal site. Reductions in the extent of habitat may impact macropod species traversing or foraging in the proposal area.
Impacts of development on movement of threatened species that maintains their lifecycle	N/A	N/A	N/A	N/A	N/A
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development	N/A	N/A	N/A	N/A	N/A
Impacts of wind turbine strikes on protected animals	N/A	N/A	N/A	N/A	N/A
Impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community	Macropods and birds at the subject site are susceptible to vehicle strikes.	Birds and macropods	PCT 268, 343	Potential long term	Injury and mortality of fauna could occur during vehicle movements to and from the proposal areas. Given limited vegetation cover, impacts to fauna crossing roads, and such, are likely to be avoided through application of and strict adherence to site speed limits (40 km/hr) and responsible driver behaviour.

Table 6.3: Assessment of indirect impacts

Indirect Impact	Nature of impact	Impacted entities	Extent	Duration	Consequence
(a) inadvertent impacts on adjacent habitat or vegetation	Edge effects including weed growth may impact retained vegetation around the proposal areas.	PCT 268, 343	All veg. zones	Long-term	These impacts may degrade areas of retained vegetation. Mitigation measures (**Table 6.5**) including weed management will help manage these impacts.
(b) reduced viability of adjacent habitat due to edge effects	As above.	PCT 268, 343	All veg. zones	Long-term	As above.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	Proposal activities, including truck movements may exacerbate noise and dust impacts.	PCT 268, 343	All veg zones	Long-term	Dust deposition on vegetation may affect plant health through reduced ability to photosynthesise. Noise may also impact fauna that shelter in habitat adjacent to the extraction area.
(d) transport of weeds and pathogens from the site to adjacent vegetation	The proposal has the potential to introduce or increase weeds occurrence in adjacent habitat.	PCT 268, 343	All veg. zones	Potential long-term	This site is already subject to significant weed infestation. Implementation of weed and pathogen control measures (**Table 6.5**) will help manage these impacts.
(e) increased risk of starvation, exposure and loss of shade or shelter	The proposal has the potential to impact small terrestrial fauna species dependent on habitat within and adjacent to the proposal area.	PCT 268, 343	All veg. zones	Long term	Native fauna will lose a small amount of habitat.
(f) loss of breeding habitats	The proposal is unlikely to impact breeding habitat important for any threatened species in the local area.	N/A	N/A	N/A	N/A
(g) trampling of threatened flora species	No threatened flora species were identified within the proposal area.	N/A	N/A	N/A	Implementation of management measures (**Table 6.5**) should help prevent trampling in areas where vegetation is retained.

Indirect Impact	Nature of impact	Impacted entities	Extent	Duration	Consequence
(h) inhibition of nitrogen fixation and increased soil salinity	It is unlikely the proposal would further exacerbate these issues.	N/A	N/A	N/A	N/A
(i) fertiliser drift	It is unlikely the proposal would further exacerbate these issues.	N/A	N/A	N/A	N/A
(j) rubbish dumping	This issue is not likely to affect the proposal site.	N/A	N/A	N/A	N/A
(k) wood collection	This issue is not likely to affect the proposal site.	N/A	N/A	N/A	N/A
(l) bush rock removal and disturbance	This issue is not likely to affect the proposal site.	N/A	N/A	N/A	N/A
(m) increase in predatory species populations	It is unlikely that the proposal works will influence or alter predatory populations.	N/A	N/A	N/A	N/A
(n) increase in pest animal populations	It is unlikely that the proposal will increase pest species populations.	N/A	N/A	N/A	N/A
(o) increased risk of fire	The proposal is unlikely to increase the risk of fire in the local area.	N/A	N/A	N/A	N/A
(p) disturbance to specialist breeding and foraging habitat	No known specialist breeding or foraging habitat is present in or adjacent to the proposal area.	N/A	N/A	N/A	N/A

6.5 Residual Impacts (Offset)

Residual impacts that cannot be avoided will be offset. It is proposed to acquit the liability of biodiversity credits (**Section 7**) by making a lump sum payment of equivalent value to the Biodiversity Conservation Trust Fund.

6.6 Other Relevant Legislation or Planning Policies

6.6.1 SEPP 44 – Koala Habitat

An assessment of koala habitat under SEPP 44 is provided below. In addressing SEPP 44, there are two questions that need to be considered:

a) *Is the land "Potential Koala Habitat"?*

'Potential Koala Habitat' is defined in SEPP 44 as, "...an area of native vegetation where trees of the type listed in Schedule 2 (Koala feed tree species) constitute at least 15% of the total number of trees in the upper or lower strata of the tree component"; and

b) *Is the land "Core Koala Habitat"?*

"Core Koala habitat" is defined as an area of land with a resident population of koalas, evidenced by attributes such as breeding females (females with young), recent sightings and historical records of a Koala population.

One primary Koala food tree, *Eucalyptus albens* (White Box), was identified in the proposal area. This food tree was primarily restricted to infill site and occurred in isolated small clumps. Whilst this tree made up 15% of the upper stratum in these areas, it did not form a part of a habitat patch.

Vegetation in the proposal area is isolated from large habitat patches with known Koala populations. There are no existing records of Koalas < 20 km of the proposal sites. Woody native vegetation cover in the assessment area is low (12.45%) which may limit movement of individuals to the proposal site. No evidence of Koala usage was recorded in the proposal area, despite targeted scat searches undertaken during the vegetation survey. Additionally, no scratches indicative of Koalas was observed on any of the trees in the proposal area. The proposal site does not support potential or core Koala habitat under the definitions of SEPP 44.

6.6.2 Matters of National Environmental Significance

The EPBC Act requires approval of the Commonwealth Minister representing the Department of the Environment and Energy (DoEE), for actions that may have a significant impact on Matters of National Environmental Significance (MNES).

6.6.2.1 Migratory Species Protected Under International Agreements

Eleven nationally listed migratory terrestrial or wetland bird species were recorded on the DoEE protected matters database (see **Appendix III**) or are considered to have potential habitat available within 20 km of the proposal site, as listed in **Table 6.4.**

None of the migratory species were recorded on site during the field survey. The proposed works are unlikely to impact on any area considered to be 'important habitat' for the above migratory species, or likely to impact a significant proportion of a migratory population.

Table 6.4: Listed migratory species with the potential to occur in the local area

Species name	Common name
Actitis hypoleucos	Common Sandpiper
Apus pacificus	Fork-tailed Swift
Calidris acuminata	Sharp-tailed Sandpiper
Calidris ferruginea	Curlew Sandpiper
Calidris melanotos	Pectoral Sandpiper
Gallinago hardwickii	Latham's Snipe
Hirundapus caudacutus	White-throated Needletail
Motacilla flava	Yellow Wagtail
Myiagra cyanoleuca	Satin Flycatcher
Numenius madagascariensis	Eastern Curlew
Rhipidura rufifrons	Rufous Fantail

6.7 Mitigation and Management Measures

The mitigation measure identified in **Table 6.5** would be implemented to assist with minimising the impacts of the project on biodiversity during construction and operation of the grain bunkers.

Table 6.5: Mitigation and management measures

Impact	Measure	Risk of failure[1]	Responsibility
Pre-Construction			
General	A Flora and Fauna Management Plan will be prepared in and implemented as part of the CEMP. It will include, but not be limited to: • Plans showing areas to be cleared and areas to be protected, including exclusion zones and weed management areas; • Procedures for unexpected threatened species finds and fauna handling; and • Protocols to manage weeds and pathogens.	Low	MH Earthmoving
Fauna handling	Before on ground works commence, contact an animal rescue agency/wildlife care group or vet before works start to ensure they are willing and available to be involved in fauna rescue and assist with injured animals. If any fauna handling is required, it must be undertaken by a licenced wildlife carer or ecologist.	Low	MH Earthmoving
Vegetation clearing	The limits of clearing including where isolated trees are to be retained around the edges of the infill area will be delineated using appropriate signage and barriers, identified on site construction drawings and during construction staff induction.	Low	MH Earthmoving
Vegetation protection	Where feasible, areas of vegetation to be retained surrounding the proposal area are to be fenced off to help prevent unintentional damage to these areas.	Low	MH Earthmoving

Impact	Measure	Risk of failure[1]	Responsibility
Disturbance to fallen timber and dead wood	All woody debris are not to be mulched or chipped but will be re-used on site for habitat improvement. Woody debris will not be dragged but lifted and placed appropriately outside the construction footprint in an adjacent area of project sites to enhance habitat. If long logs are required to be cut to assist relocation, logs must be cut away from hollow ends.	Low	MH Earthmoving
Invasion and spread of pathogens and disease	Pathogen control protocols shall be developed and implemented in accordance with the requirements of the *Biosecurity Act 2015*.	Low	MH Earthmoving
Invasion and spread of weeds	Weed control protocols shall be developed and implemented as part of the CEMP.	Low	MH Earthmoving
During operation			
Water quality	Potential water quality impacts to farm dams arising from run off are to be managed through appropriate sediment control measures specified in the CEMP.	Low	MH Earthmoving
Threatened species protection	If unexpected threatened fauna or flora species are discovered, works must stop immediately until threatened flora or fauna species are reviewed and assessed by ecologists.	Low	MH Earthmoving
Fauna protection	Due care should be made by all vehicle operators to take care and avoid any potential collision with fauna, such as macropods (Kangaroos) that may transverse the project site. A site speed limit of 40 km/h should be observed.	Low	MH Earthmoving
Pest Animal monitoring/ control	Pest animals such as rodents, foxes, rabbits, wild dogs, feral cats and pigs are controlled on a needs basis to prevent degradation of retained areas of vegetation/ habitat.	Moderate Biophysical risk: Pest animals may continue to colonise the proposal site from surrounding areas	MH Earthmoving
Post operation			
Preparation of a rehabilitation plan	A rehabilitation plan needs to be prepared prior to site shut down. Restoration should include planting/sowing native grasses (local provenance) identified during this assessment (see **Appendix I**) and listed in PCT 268.	Low	MH Earthmoving

7. IMPACT SUMMARY

This chapter summarises the impact to PCTs and the number of credit classes required for ecosystem and species credits. The BAM Calculator credit and payment report is provided in **Appendix IV**.

7.1 Impact to Vegetation Integrity

Table 7.1 summarises the impact of the proposal to the vegetation integrity score of PCT 268 and 343 on site. PCT 268 is Serious and Irreversible Impact (SAII) entity. However, no ecosystem credits were generated because a VIS <15 was obtained.

Table 7.1: Impact to the vegetation integrity score of PCT 1324

PCT/ Vegetation Zone	Listing		Current score	Future score	Change in score	BRW[1]
	BC	EPBC				
PCT 268, Zone 1	E	-	8.5	0	- 8.5	2
PCT 268, Zone 2	E	-	8.4	0	- 8.4	2
PCT 343, Zone 1	-	-	15	0	- 15	2
PCT 343, Zone 2	-	-	18.5	0	- 18.5	2

[1] Biodiversity Risk Weighing (for ecosystem credits). Biodiversity risk weighting for a TEC or a PCT containing threatened species habitat is based on the sensitivity to loss class of the TEC/PCT and the highest sensitivity to gain class of the predicted threatened species. For further explanation, see Appendix 7 of the BAM (2017).

7.2 Ecosystem Credits

The ecosystem credits required to offset the proposal are provided in **Table 7.2**. A total of 16 credits are required to offset the development. **Table 7.3** lists like-for-like offset rules that apply to PCT 343.

Table 7.2: Ecosystem credits summary

PCT	Vegetation Zone	Area Impacted (ha)	Credits required
268	1	0.30	0
268	2	1.47	0
343	1	1.39	0
343	2	0.29	3
343	3	0	0
TOTAL ECOSYSTEM CREDITS REQUIRED			**3**

Table 7.3: Like-for-like credit retirement options for PCT 343

Group	Like-for-like credit retirement options
Class	Western Slopes Dry Sclerophyll Forests, this includes PCT's: 54, 110, 333, 341, 343, 358, 472, 1279, 1668
Trading group	Western Slopes Dry Sclerophyll Forests - ≥ 70% - <90% cleared group (including Tier 4 or higher).
HBT	Yes
IBRA region	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site.

7.3 Species Credits

The species credits required to offset the proposal are provided in **Table 7.4.** A total of 18 credits are required to offset the development for two candidate species. The species polygon for both species includes vegetation zones with Eucalyptus trees.

Table 7.4: Species credits summary

PCT	NSW listing (BC Act)	Species presence type	PCT/ (Vegetation Zone)	Potential SAII	Area Impacted (ha)	Credits required
Anthochaera phrygia Regent Honeyeater	CE	Assumed present	PCT 268 (zone 2)	Yes	1.47	9
Lathamus discolor Swift Parrot	E	Assumed present	PCT 268 (zone 2)	Yes	1.47	9
TOTAL SPECIES CREDITS REQUIRED						**18**

7.4 Credit Costs

The total cost of credits, should the Biodiversity Conservation Trust (BCT) be used to offset the impacts, are currently (as at 6 November, 2019) estimated to be $32,166.74 (incl. GST). Details are provided in **Table 7.5** and **Appendix IV**.

Table 7.5: Estimated credit costs

PCT or Species	Baseline price /credit	Price per credit	No. of credits	Final credits price (ex GST)	Final credits price (in GST)
Ecosystem Credits					
268: *White Box - Blakely's Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion*	$4,248.35	$6,188.95	0	-	
343: *Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamorphic substrates*	$4,248.35	$6,188.95	3	$18,566.85	$20,423.54
TOTAL			3		$20,423.54
Species Credits					
Anthochaera phrygia Regent Honeyeater	N/A	$432.54	9	$4,851.04	
Lathamus discolor Swift Parrot	N/A	$521.96	9	$5,824.60	
TOTAL			18	$10,675.64	$11,743.20
GRAND TOTAL					**$32,166.74**

8. CONCLUSION

Through application of the BAM, this BDAR has assessed impacts on biodiversity values including threatened species and threatened ecological communities. The project, located near Gundagai, proposes to utilise the Bangus gravel quarry as a waste management facility by landfilling over an area of 485,000 m^3 with an intended capacity of 60,000 tonnes per annum of non-putrescible waste material. The proposal also includes provision of a temporary stockpile site. In total, the proposal has a footprint of approximately 6.17 ha (including 1.78 ha for the stockpile site and 4.45 ha for the infill site) and may result in clearing of up to 3.45 ha of existing native vegetation.

Field assessments have identified that PCT 268 and 343 will be impacted by the proposal. PCT 268 is associated with *White Box-Yellow Box- Blakely's Red Gum Woodland*, a TEC, listed as Endangered in NSW and Critically Endangered Nationally. This PCT (restricted to the infill area) is in very poor condition. VI Scores < 15 were obtained. Hence, no ecosystem credits are required to offset impacts to this community, according to the BAM. This community consists of a weedy herbaceous ground layer with occasional mature *Eucalyptus albens* and *E. blakelyi* stems located around the boundary of the infill area.

PCT 343 is not associated with any TECs. This PCT (restricted to the stockpile site) was recorded in varying condition across three vegetation zones. VI Scores were found to range from 15.0 to 50.7 at the time of assessment. Consistent to the infill area, vegetation zones are dominated by a weedy ground layer of forbs and grasses. The community includes *Eucalyptus sideroxylon* as the primary canopy species and *Lissanthe strigosa* in the understorey.

This project has avoided impacts to biodiversity values at the project site by locating the proposal areas in vegetation that is degraded/ significantly disturbed with low native species cover. The project has also been designed to minimise impacts to large trees growing along the fence lines on the southern, western and eastern boundaries on the infill proposal lots. The proposal also seeks to retain 4/7 hollow bearing trees identified across the proposal areas. Furthermore, the proposal area does not form a part of any habitat linkages that would support the dispersal of wildlife in the local landscape.

The BAM calculator identified a total of 22 candidate species (species credit species) and 26 predicted species (ecosystem credit species) required consideration for assessment. One threatened species, *Miniopterus orianae oceanensis* (Large Bent-winged Bat) was identified adjacent the stockpile site, over a farm dam using a song meter. This species is unlikely to be impacted by the proposal given no breeding habitat (caves, tunnels, mines) is located within or nearly (within 500 m) of the proposal site.

No candidate species were identified in the proposal areas; however, two species *Anthochaera phrygia* (Regent Honeyeater) and *Lathamus discolor* (Swift Parrot) were assumed present. This follows the best guidance and the precautionary principle, considering the proposal area contains known important feed trees for this species (*E. albens* and *E. sideroxylon*) that provide nectar and pollen and potential breeding habitat (hollows 5-10 cm in diameter). In addition, *L. discolour* is known to inhabit the local area, and has been recorded 167 times within 20 km of the proposal lots. Out of the 20 remaining candidate species, 15 were surveyed and found to be absent and five species were assessed as absent (because habitat was assessed as degraded or there were geographic limitations).

Key safeguard and management measures identified to minimise and avoid biodiversity impacts include, but are not limited to, detail delineation of vegetation clearing limits, including marking trees that are to be retained, development of protocols/management plans to control invasion and spread of pathogens and weeds and completion of a site rehabilitation plan.

A total of three ecosystem credits and 18 species credits are required to offset the clearing of 1.77 ha of PCT 248 and 1.68 ha of PCT 343. The proponent intends to acquit the liability of credits by making a lump sum payment of equivalent value to the Biodiversity Conservation Trust Fund.

The assessments identified that the proposed development is unlikely to significantly impact on any Matters of National Environment Significance.

.

9. REFERENCES

The following information was used in the preparation of this report:

Auld, B.A. and Medd, R.W. (1996). *Weeds: An Illustrated Botanical Guide to the Weeds of Australia.* Inkata Press, Sydney.

Barker, J., Grigg, G.C. and Tyler, M.J. (1995). *A Field Guide to Australian Frogs*. Surrey, Beatty and Sons, New South Wales.

Churchill, S. (2008). *Australian Bats*. Reed New Holland, Sydney.

Commonwealth of Australia (2013). Matters of National Environmental Significance Significant impact guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999*

Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. and Leigh, J.H. (2011). *Plants of Western New South Wales.* Soil Conservation Service, Sydney.

Department of Environment and Climate Change (2007). *Threatened species assessment guidelines: the assessment of significance*. Sydney South.

Department of Environment and Climate Change (2007b). *White Box-Yellow Box- Blakely's Red Gum Woodland*. Sydney South.

Department of Environment and Heritage (2006). *White Box – Yellow Box – Blakey's Red Gum grassy woodlands and derived native grassland*. EPBC Policy Act Statements, Canberra.

Department of Environment and Heritage (2012). Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia. A guide to the identification, assessment and management of a nationally threatened ecological community *Environment Protection and Biodiversity Conservation Act 1999,* Canberra.

Department of Environment and Conservation (2004), Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft), New South Wales Department of Environment and Conservation, Hurstville, NSW.

Department of Primary Industries (2013). *Grasses of the NSW Slopes and Adjacent Plains*. Tocal College, Paterson.

Harden, G (1991-2000). *Flora of New South Wales. Vols 1-4.* NSW University Press.

Riverina Local Land Services (2017). Riverina Regional Strategic Weed Management Plan 2017-2022, Hunter Local Land Services, June 2017.

NSW Department of Environment and Conservation (2004). *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities. Working Draft*.

NSW Scientific Committee (2002) *White box yellow box Blakelys red gum woodland - Endangered ecological community determination - final*. DEC (NSW), Sydney

OEH (2016). NSW Guide to Surveying Threatened Plants, NSW Office of Environment and Heritage, Sydney.

OEH (2017). *Biodiversity Assessment Method*. NSW Office of Environment and Heritage, Sydney.

OEH (2018). *Atlas of NSW Wildlife Database.* Licenced database accessed September 2019

OEH (2018). http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx, Office of Environment and Heritage Threatened Species Profiles website, Date: October 2019.

OEH (2019). https://www.environment.nsw.gov.au/bioregions/DarlingRiverinePlainsBioregion.htm Office of Environment and Heritage Darling Riverine Plains – subregions website, Date: July 2019.

OEH (2019b). *Biodiversity Assessment Calculator*. Webpage: https://www.lmbc.nsw.gov.au/bamcalc. Accessed: January 2019. NSW Office of Environment and Heritage, Hurstville.

OEH (2019c). Threatened Biodiversity Species Profiles, accessed through Bionet. Webpage: https://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/LinksEdit.aspx?pId=10159 &pType=SpeciesCode&a=1 Accessed: July 2019. NSW Office of Environment and Heritage, Hurstville.

Richardson, F., Richardson, R. and Sheppard, R. (2011). *Weeds of the South-East – An Identification Guide for Australia*. WeedInfo, Victoria.

Simpson, K. and Day, N. (2010). *Field Guide to the Birds of Australia.* Penguin Publishing, Camberwell Victoria.

Van Dyck, S., Gynther, I. and Baker, A. (Eds) (2013). *Field Companion to The Mammals of Australia*. New Holland Publishing, Sydney.

Triggs, B. (1996). *Tracks, Scats and Other Traces - A Field Guide to Australian Mammals*. Oxford University Press, Melbourne.

Wilson, S. and Swan, G. (2010). *A Complete Guide to the Reptiles of Australia.* New Holland Publishing, Sydney.

Appendix I Flora and Fauna Species List

AI.1. FLORA SPECIES LIST

The following is a list of all flora species recorded within the site. It should be noted that such a list cannot be considered comprehensive, but rather indicative of the flora. A period of some years is often required to identify all species present in an area, particularly for cryptic or seasonally detectable species (such as orchids, some grasses and grass like herbs).

Note: weeds are listed as 'EXOTIC or HTE (High Threat Exotic)' under the column BAM Growth Form Group.

FAMILY	*Scientific Name*	Common Name	BAM Growth Form Group
AMARANTHACEAE	*Ptilotus spp.*		Forb (FG)
ANTHERICACEAE	*Arthropodium minus*	Small Vanilla Lily	Forb (FG)
ASTERACEAE	*Arctotheca calendula*	Capeweed	EXOTIC
	Taraxacum officinale	Dandelion	EXOTIC
BORAGINACEAE	*Echium plantagineum*	Patterson's Curse	EXOTIC
CAMPANULACEAE	*Wahlenbergia spp.*	Bluebell	Forb (FG)
CARYOPHYLLACEAE	*Petrorhagia dubia*		Shrub (SG)
DILLENIACEAE	*Hibbertia riparia*		Shrub (SG)
ERICACEAE	*Lissanthe strigosa*	Irongrass	Grass & grasslike (GG)
FABACEAE (FABOIDEAE)	*Dillwynia sericea*	Cloak Fern, Mulga Fern, Rock Fern	Fern (EG)
	Trifolium tomentosum	Woolly Clover	EXOTIC
	Daviesia leptophylla		Shrub (SG)
FABACEAE (MIMOSOIDEAE)	*Acacia decora*	Western Silver Wattle	Shrub (SG)
	Acacia pycnantha	Golden Wattle	EXOTIC
GERANIACEAE	*Erodium botrys*	Long Storksbill	EXOTIC
	Geranium solanderi	Native Geranium	Forb (FG)
HALORAGACEAE	*Haloragis spp.*	A Raspwort	Forb (FG)
JUNCACEAE	*Juncus spp.*	A Rush	Grass & grasslike (GG)
LOMANDRACEAE	*Lomandra patens*	Irongrass	Grass & grasslike (GG)
	Lomandra spp.	Mat-rush	Grass & grasslike (GG)
LORANTHACEAE	*Amyema spp.*	Mistletoe	Other (OG)

	Muellerina eucalyptoides		Other (OG)
MYRTACEAE	*Eucalyptus albens*	A Raspwort	Forb (FG)
	Eucalyptus blakelyi	Blakely's Red Gum	Tree (TG)
	Eucalyptus sideroxylon	Mugga Ironbark	Tree (TG)
OXALIDACEAE	*Oxalis perennans*		Forb (FG)
	Oxalis pes-caprae	Soursob	EXOTIC
POACEAE	*Aira cupaniana*	Silvery Hairgrass	EXOTIC
	Anthoxanthum odoratum	Sweet Vernal Grass	EXOTIC
	Aristida behriana	Smooth Brome	EXOTIC
	Aristida vagans	Threeawn Speargrass	Grass & grasslike (GG)
	Austrodanthonia spp.	A Wallaby Grass	Grass & grasslike (GG)
	Austrostipa spp.	A Speargrass	Grass & grasslike (GG)
	Briza minor	Shivery Grass	EXOTIC
	Bromus diandrus	Great Brome	HTE
	Bromus hordeaceus	Soft Brome	EXOTIC
	Bromus racemosus	Smooth Brome	EXOTIC
	Hordeum leporinum	Barley Grass	EXOTIC
	Lolium rigidum	Wimmera Ryegrass	EXOTIC
	Lolium spp.	A Ryegrass	EXOTIC
	Pentaschistis airoides	False Hairgrass	EXOTIC
	Poa bulbosa	Bulbous Poa	EXOTIC
	Vulpia myuros	Rat's Tail Fescue	EXOTIC
POLYGONACEAE	*Rumex brownii*	Swamp Dock	Forb (FG)
PTERIDACEAE	*Cheilanthes sieberi*	Rock Fern	Fern (EG)
PTERIDACEAE	*Cheilanthes spp.*	Cloak Fern, Mulga Fern, Rock Fern	Fern (EG)

AI.2. FAUNA SPECIES LIST

The following is a list of all fauna species recorded within the site during the survey period.

Observation Type:

O – Observed	**B** - Burnt	**F** - Tracks/scratchings
T - Trapped or netted	**H** - Hair, feathers, or skin	**Y** - Bone or teeth
R - Road kill	**P** - Scat	**D** - Dog kill
W - Heard call	**C** - Cat kill	**Z** - In raptor/owl pellet
V - Fox kill	**E** - Nest/roost	**K** - Dead
M - Miscellaneous	**X** - In scat	**U** – Bat Recording

Notes
* – Indicates an introduced species.

Family	*Scientific Name*	Common Name	BC Act	EPBC Act	Observation Type
AMPHIBIAN					
Hylidae	*Litoria peronii*	Peron's Tree Frog			O
Limnodynastidae	*Limnodynastes tasmaniensis*	Eastern Sign-bearing Froglet			O
Myobatrachidae	*Crinia parinsignifera*	Spotted Grass Frog			O
AVES					
Accipitridae	*Elanus axillaris*	Black-shouldered Kite			O
Alcedinidae	*Dacelo novaeguineae*	Laughing Kookaburra			O
Anatidae	*Anas superciliosa*	Pacific Black Duck			O
Artamidae	*Cracticus tibicen*	Australian Magpie			O
	Strepera graculina	Pied Currawong			O
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo			O
e	*Eolophus roseicapillus*	Galah			O
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike			O
Columbidae	*Columba livia*	Rock Dove			O
Corcoracidae	*Corcorax melanorhampho s*	White-winged Chough			O

Falconidae	*Falco cenchroides*	Nankeen Kestrel			O
Monarchidae	*Grallina cyanoleuca*	Magpie-lark			O
Psittacidae	*Platycercus elegans*	Crimson Rosella			O
	Platycercus eximius	Eastern Rosella			O
	Polytelis swainsonii	Superb Parrot	V	V	O (foraging - outside of proposal areas
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail			O
	Rhipidura leucophrys	Willie Wagtail			O
MAMMALS					
Leporidae	*Oryctolagus cuniculus*	Rabbit			O
Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo			O
	Wallabia bicolor	Swamp Wallaby			O
Phalangerida	*Trichosurus vulpecula*	Common Brushtail Possum			O
Emballonuridae	*Saccolaimus flaviventris*	Inland Broad-nosed Bat			U
Miniopteridae	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V		U
Molossidae	*Austronomus australis*	White-striped free-tailed bat			U
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat			U
	Chalinolobus morio	Chocolate Wattled Bat			U
	Nyctophilus sp.				U
	Vespadelus regulus	Little Forest Bat			U

Appendix II Habitat Assessment Table

Likelihood of occurrence criteria

Likelihood	Criteria
Recorded	The species was observed in the study area during the current survey.
High	It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (that is, for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (20km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration.
Moderate	Potential habitat is present in the study area. Species unlikely to maintain sedentary populations; however, may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (that is, for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
Low	It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (10km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (that is, for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.
None	Suitable habitat is absent from the study area.

Scientific name	Common name	BC ACT	EPBC Act	Habitat requirements	Records	Potential occurrence
Flora						
Ammobium craspedioides	Yass Daisy	V	V	Assessed as a candidate species - See **Section 5.**	1	Low
Amphibromus fluitans	River Swamp Wallaby-grass	V	V	This perennial grass rows mostly in permanent swamps. The species needs wetlands which are at least moderately fertile and which have some bare ground, conditions which are produced by seasonally-fluctuating water levels.	0	Low
Caladenia arenaria	Sand-hill Spider Orchid	E	E	Occurs in woodland with sandy soil, especially that dominated by *Callitris glaucophylla*. All records of the orchid are from within Yarrenjerry State Forest, which according to vegetation mapping, is consistent with PCT 80. This PCT was recorded often along the proposed pipeline route. Due to a lack of surveys in the study area it is plausible that this species may occur in road corridors subject to the proposal.	3	Low
Caladenia concolor	Crimson Spider-orchid	E	V	Assessed as a candidate species - See **Section 5.**	0	Low
Grevillea wilkinsonii	Tumut Grevillea	E	E	The Tumut Grevillea can grow in the proximity to water such as near the Goobarragandra River. Typically the	0	Low

				associated vegetation is remnant riverine shrub adjacent to open forest.		
Pomaderris cotoneaster	Cotoneaster Pomaderris	E	E	Predominat habitat is forested country including deep friable soil, rocky terrain beside creeks or rocky slopes and steep sandstone gullies. Populations are normally isolated with numbers ranging from a few to in the hundreds.	0	Low
Prasophyllum petilum	Tarengo Leek Orchid	E	E	This orchid is known from seven populations in open eucalypt woodland and grassland in New South Wales. The species' area of occupancy is estimated to be 1.5 km^2 with an estimated population size based on surveys in 2006 of 460 mature individuals.	0	Low
Swainsona recta	Small Purple-pea	E	E	Assessed as a candidate species – See **Section 5.**	0	Low
Swainsona sericea	Silky Swainson-pea	V		Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes, including in association with *Callitris sp*. One individual was recorded in the search area at Ardlethan in 1916, 13 km from the proposed Stage 2 pipeline. Targeted searches did not find any individuals.	1	Low
Thesium australe	Austral Toadflax	V	V	Found in very small populations scattered across eastern NSW, along the coast, and from Northern to Southern Tablelands. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast often in association with Kangaroo Grass.		
Amphibia						
Crinia sloanei	Sloane's Froglet	V	E	Habitat includes grasslands, woodlands and disturbed areas that are periodically inundated with water.	0	Low
Litoria booroolongensis	Booroolong Frog	E	E	Assessed as a candidate species – See **Section 5.**	1	Low
Litoria raniformis	Growling Grass Frog	E	V	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys.	0	Low
Aves						
Anthochaera phrygia	Regent Honeyeater	CE	CE	Inhabits eucalypt open forests and woodlands, predominantly box-ironbark types, but also Spotted Gum and Swamp Mahogany on the coast. The species also	0	Low

				inhabits River She-oak gallery forest with *Amyema cambagei* (Needle-leaf Mistletoe). It is estimated that the NSW population of Regent Honeyeaters may now be fewer than 250 mature individuals.		
Ardea ibis	Cattle Egret		C,J	Cattle egret occur in tropical and temperate grasslands, wooded lands and terrestrial wetlands. The preferred feeding habitat is low lying grasslands, pastures with high grass and croplands.	1	Low
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V		In NSW, this species is widespread from coast to inland, including the western slopes of the Great Dividing Range and farther west. It is sparsely scattered in, or largely absent from, much of the Upper Western region. Despite records showing a wide distribution and occurrence in a variety of habitats, the Dusky Woodswallow is considered to be a woodland dependent bird with the majority of breeding records, as well as presence records within the breeding period, occurring on the western slopes of the Great Dividing Range, a region dominated by woodland and open dry forest.	156	Moderate Common habitat present. May forage or rest within proposal site but not considered important habitat for this species.
Botaurus poiciloptilus	Australasian Bittern	E	E	Widespread but uncommon over south-eastern Australia. Lives alone or in loose groups and favours permanent fresh-waters dominated by sedges, rushes, reeds or cutting grasses (eg. *Phragmites*, *Scirpus, Eleocharis*, *Juncus*, *Typha*, *Baumea* and *Gahnia*).	0	Low
Calidris ferruginea	Curlew Sandpiper	E	CE	Occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	0	Low
Callocephalon fimbriatum	Gang-gang Cockatoo	V		Assessed as a candidate species – See **Section 5.**	32	Moderate
Chthonicola sagittata	Speckled Warbler	V		Lives in a wide range of eucalypt-dominated vegetation that typically includes scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. This species	9	Low

			is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast.		
Circus assimilis	Spotted Harrier	V	Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	1	Low
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. Usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging.	481	Moderate Common habitat present. May forage or rest within proposal site but not considered important habitat for this species.
Daphoenositta chrysoptera	Varied Sittella	V	A sedentary bird, in NSW distribution is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	25	Moderate Common habitat present. May forage or rest within proposal site but not considered important habitat for this species.
Falco subniger	Black Falcon	V	In NSW the Black Falcon occurs in inland regions. There is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kms.	4	Low
Glossopsitta pusilla	Little Lorikeet	V	Forages primarily in the canopy of open Eucalypt forest and woodland, yet also forages on Angophoras, Melaleucas and other tree species. Riparian habitats are often utilised. Isolated flowering trees in open country, eg paddocks, roadside remnants and urban trees also help sustain viable populations of the species.	7	Low

Grantiella picta	Painted Honeyeater	V	V	Nomadic and occurs at low densities throughout its range. The greatest concentrations are from the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests.	0	Low
Hieraaetus morphnoides	Little Eagle	V		Assessed as a candidate species – See **Section 5.**	3	Low
Hirundapus caudacutus	White-throated Needletail		C,J,	In eastern Australia, the bird is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground	62	Moderate Common habitat present. May forage or rest within proposal site but not considered important habitat for this species.
Lathamus discolor	Swift Parrot	E	CE	Assessed as a candidate species – See **Section 5.**	167	High
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V		Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	12	Moderate Common habitat present. May forage or rest within proposal site but not considered important habitat for this species.
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V		The eastern subspecies extends south from central Queensland, through NSW, Victoria into south eastern South Australia. This bird occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, including *E. albens, E. melliodora* & *E. blakelyi*.	152	Moderate Common habitat present. May forage or rest within proposal site but not considered important habitat for this species.

Merops ornatus	Rainbow Bee-eater		J	The Rainbow Bee-eater is distributed across much of mainland Australia. The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water.	185	Moderate Common habitat present. May forage or rest within proposal site but not considered important habitat for this species.
Neophema pulchella	Turquoise Parrot	V		The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	35	Moderate
Ninox connivens	Barking Owl	V		Assessed as a candidate species – See **Section 5.**	1	Low
Numenius madagascariensis	Eastern Curlew		CE	Primarily coastal distribution. Found in all states, particularly the north, east, and south-east regions. Eastern Curlews are rarely recorded inland. In NSW is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast.	0	Low
Oxyura australis	Blue-billed Duck	V		This duck is almost wholly aquatic, preferring deep water in large permanent wetlands or dams where aquatic flora is abundant.	4	Low
Petroica boodang	Scarlet Robin	V		Primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. This species lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. Habitat usually contains abundant logs and fallen timber and these are important components of its habitat.	23	Moderate Common habitat present. May forage or rest within proposal site but not considered important habitat for this species.
Petroica phoenicea	Flame Robin	V		Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys.	21	Moderate

Polytelis swainsonii	Superb Parrot	V	V	Assessed as a candidate species – See **Section 5**.	196	Moderate
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V		In NSW, eastern sub-species of the Grey-crowned Babbler occurs on the western slopes of the Great Dividing Range. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. It builds and maintains several conspicuous, dome-shaped stick nests about the size of a football.	1	Moderate Common habitat present. May forage or rest within proposal site but not considered important habitat for this species.
Rostratula australis	Australian Painted-snipe	E	E	Most records are from the south east, particularly the Murray Darling Basin. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	0	Low
Stagonopleura guttata	Diamond Firetail	V		The bird is widely distributed in NSW including concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. The bird is found in grassy eucalypt woodlands, including Box-Gum Woodlands.	129	Moderate Common habitat present. May forage or rest within proposal site but not considered important habitat for this species.
Fish						
Galaxias rostratus	Flathead Galaxias		CE	The flathead galaxias is only known from the southern half of the Murray-Darling Basin system.	0	Low
Maccullochella macquariensis	Trout Cod	E	E	The Trout Cod is known from a single natural population, two stable translocated populations and many stocked populations. The single naturally occurring population is restricted to a small (approximately 120 km) stretch of the Murray River from below Yarrawonga Weir to Strathmerton.	0	Low
Maccullochella peelii	Murray Cod		V	The Murray Cod occurs naturally in the waterways of the Murray-Darling Basin and is known to live in a wide range	0	Low

				of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers and billabongs.		
Macquaria australasica	Macquarie Perch	E	E	Extant populations of the Macquarie Perch are known to occur in the upper reaches of the Lachlan, Murrumbidgee and Murray catchments in the Murray-Darling Basin, and in the Hawkesbury/Nepean catchment on the east coast.	0	Low
Insecta						
Synemon plana	Golden Sun Moth	E	CE	Occurs in natural temperate grasslands and grassy box-gum woodlands dominated by wallaby grasses. Several wallaby grass species could be present in habitat typically associated with spear-grass or Kangaroo grass.	0	Low
Mammalia						
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites with basking and latrine sites often nearby.	1	Low
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		The Large Bent-winged Bat hunts in forested areas for flying insects above the tree canopy. Caves are the primary roosting habitat with populations centred on maternity caves.	9	Low
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	Inhabits a variety of vegetation types, including mallee, bulloke *Allocasuarina leuhmanni* and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.	0	Low
Petauroides volans	Greater Glider		V	Greater gliders are found along the eastern coast of the Australian mainland, from eastern Queensland to southern Victoria. Feed exclusively on eucalypts.	0	Low
Petaurus australis	Yellow-bellied Glider	V		Occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north;	1	Low

				moist coastal gullies and creek flats to tall montane forests in the south.		
Petaurus norfolcensis	Squirrel Glider	V		Assessed as a candidate species – See **Section 5.**	1	Low
Phascolarctos cinereus	Koala	V	V	Assessed as a candidate species – See **Section 5.**	0	Low
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water and in vegetation with a dense canopy.	5	Low
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In NSW, there are scattered records of this species across the New England Tablelands and North West Slopes. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows	1	Low
Reptilia						
Aprasia parapulchella	Pink-tailed Worm-lizard	V	V	In NSW this Legless Lizard is known from the Central and Southern Tablelands, and the South Western Slopes. Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks.	0	Low
Delma impar	Striped Legless Lizard	V	V	Found mainly in Natural Temperate and occasionally in open Box-Gum Woodland. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as *Themeda australis, Austrostipa spp.* and *Poa spp.,* and occasionally *Austrodanthonia spp*. Sometimes present in modified grasslands with a significant content of exotic grasses or surface rocks (used for shelter).	0	Low

[1] Status Abbreviations: V – Vulnerable, E – Endangered, CE – Critically Endangered, C,J -JAMBA, CAMBA (migratory species), X – extinct.

[2] Number of OEH wildlife atlas records in selected area Approx. 20km radius [North: -34.96 West: 147.81 East: 148.21 South: -35.27].

Appendix III Matters of National Environmental Significance Search

Australian Government
Department of the Environment and Energy

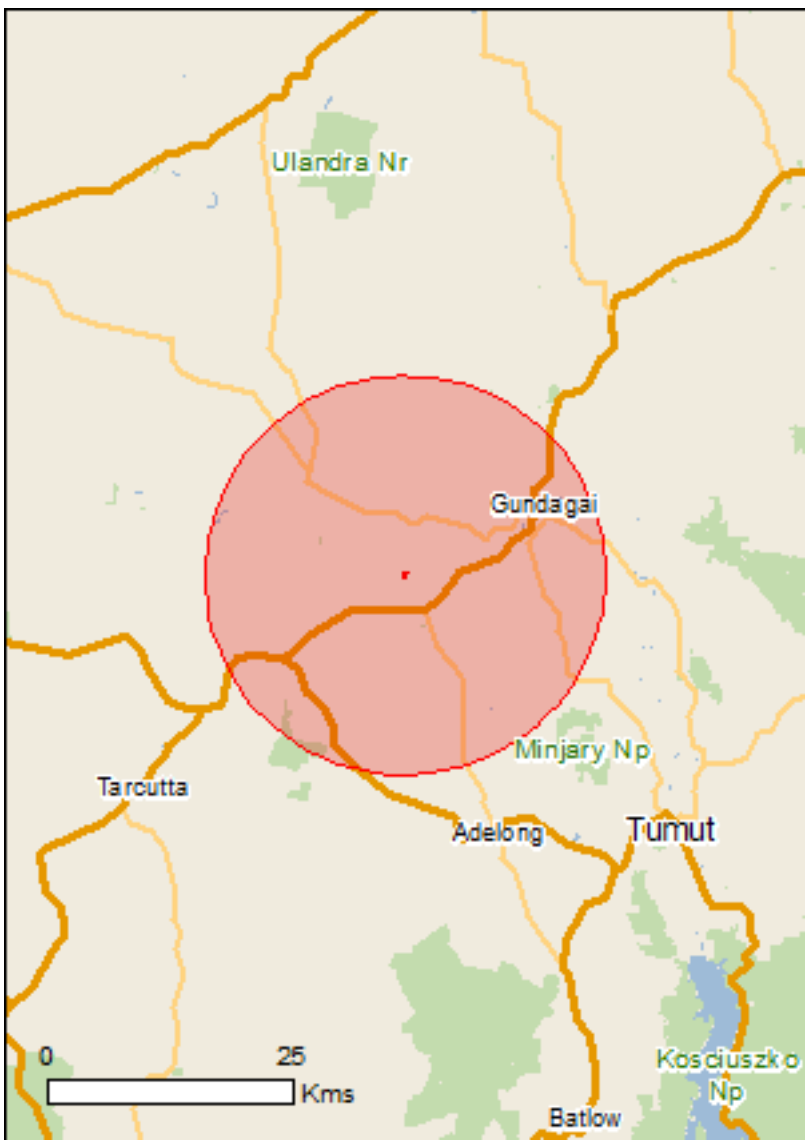
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

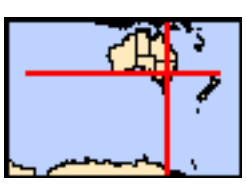
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 27/09/19 09:50:30



Coordinates
Buffer: 20.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	33
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	3
Regional Forest Agreements:	1
Invasive Species:	32
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Banrock station wetland complex	600 - 700km upstream
Hattah-kulkyne lakes	400 - 500km upstream
Riverland	600 - 700km upstream
The coorong, and lakes alexandrina and albert wetland	700 - 800km upstream

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Rostratula australis		
Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Galaxias rostratus		
Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area
Maccullochella macquariensis		
Trout Cod [26171]	Endangered	Species or species habitat may occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Crinia sloanei		
Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area
Litoria booroolongensis		
Booroolong Frog [1844]	Endangered	Species or species habitat known to occur within area
Litoria raniformis		
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat may occur within area
Insects		
Synemon plana		
Golden Sun Moth [25234]	Critically Endangered	Species or species habitat likely to occur within area
Mammals		
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
Ammobium craspedioides		
Yass Daisy [20758]	Vulnerable	Species or species habitat likely to occur within area
Amphibromus fluitans		
River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat may occur within area
Caladenia arenaria		
Sand-hill Spider-orchid [9275]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Caladenia concolor Crimson Spider-orchid, Maroon Spider-orchid [5505]	Vulnerable	Species or species habitat likely to occur within area
Grevillea wilkinsonii Tumut Grevillea [56396]	Endangered	Species or species habitat known to occur within area
Pomaderris cotoneaster Cotoneaster Pomaderris [2043]	Endangered	Species or species habitat may occur within area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area
Delma impar Striped Legless Lizard [1649]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Commission

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Ellerslie	NSW
Minjary	NSW
Tumblong	NSW

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Southern RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-35.116117 147.976464,-35.116196 147.981367,-35.117486 147.981743,-35.117758 147.981367,-35.117714 147.979479,-35.118416 147.979114,-35.118828 147.979114,-35.11896 147.976593,-35.118205 147.976164,-35.11731 147.976121,-35.116099 147.976464,-35.116108 147.976464,-35.116117 147.976464

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix IV BAM Credit Summary and Payment Report

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018119/BAAS19023/19/00018120	Bangus Infill BDAR	30/10/2019
Assessor Name	Report Created	BAM Data version *
	06/11/2019	16
Assessor Number	BAM Case Status	Date Finalised
	Finalised	06/11/2019
Assessment Revision	Assessment Type	
0	Part 4 Developments (General)	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamophic substrates in the Tarcutta - Gundagai region, NSW South Western Slopes Bioregion								
3	343_Zone1	15.0	1.4	0.25	High Sensitivity to Potential Gain	2.00		0
4	343_Zone2	18.5	0.3	0.25	High Sensitivity to Potential Gain	2.00		3

							Subtotal	**3**
White Box - Blakely's Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion								
1	268_Zone1	8.5	0.3	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
2	268_Zone2	8.4	1.5	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
							Subtotal	**0**
							Total	**3**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits
Anthochaera phrygia / Regent Honeyeater (Fauna)						
268_Zone2	8.4	1.47	0.25	3	True	9
					Subtotal	**9**
Lathamus discolor / Swift Parrot (Fauna)						
268_Zone2	8.4	1.47	0.25	3	True	9
					Subtotal	**9**

Biodiversity payment summary report

Assessment Id	Payment data version	Assessment Revision	Report created
00018119/BAAS19023/19/00018120	62	0	06/11/2019

Assessor Name	Assessor Number	Proposal Name	BAM Case Status
		Bangus Infill BDAR	Finalised

Assessment Type	Date Finalised
Part 4 Developments (General)	06/11/2019

PCT list

Include	PCT common name	Credits
Yes	**268 -** White Box - Blakely's Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion	0
Yes	**343 -** Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamophic substrates in the Tarcutta - Gundagai region, NSW South Western Slopes Bioregion	3

Species list

Include	Species	Credits
Yes	***Lathamus discolor*** (Swift Parrot)	9
Yes	***Anthochaera phrygia*** (Regent Honeyeater)	9

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Biodiversity payment summary report

IBRA sub region	PCT common name	Baseline price	Dynamic coefficient	Market coefficient	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Inland Slopes	**268 -** White Box - Blakely's Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland on shallow soils on hills in the NSW South Western Slopes Bioregion **Warning: This PCT has NO trades recorded**	$4,248.35	0.71782200	2.51860000	19.99%	$199.66	1.0000	$6,188.95	0	$0.00
Inland Slopes	**343 -** Mugga Ironbark - Red Box - Red Stringybark - Western Grey Box grass/shrub woodland on metamophic substrates in the Tarcutta - Gundagai region, NSW South Western Slopes Bioregion **Warning: This PCT has NO trades recorded**	$4,248.35	0.71782200	2.51860000	19.99%	$199.66	1.0000	$6,188.95	3	$18,566.85

Subtotal (excl. GST)	**$18,566.85**
GST	**$1,856.68**
Total ecosystem credits (incl. GST)	**$20,423.54**

Biodiversity payment summary report

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10455	***Lathamus discolor*** (Swift Parrot)	Endangered	$521.96	19.9900%	$20.88	9	$5,824.60
10841	***Anthochaera phrygia*** (Regent Honeyeater)	Critically Endangered	$432.54	19.9900%	$20.00	9	$4,851.04

Subtotal (excl. GST)	**$10,675.64**
GST	**$1,067.56**
Total species credits (incl. GST)	**$11,743.20**

Grand total	**$32,166.74**